12-2014

Sitopia

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PLAY

TO

CS

Cesi Kohen

Thesis Prep Book

VIEWER DISCRETION IS ADVISED

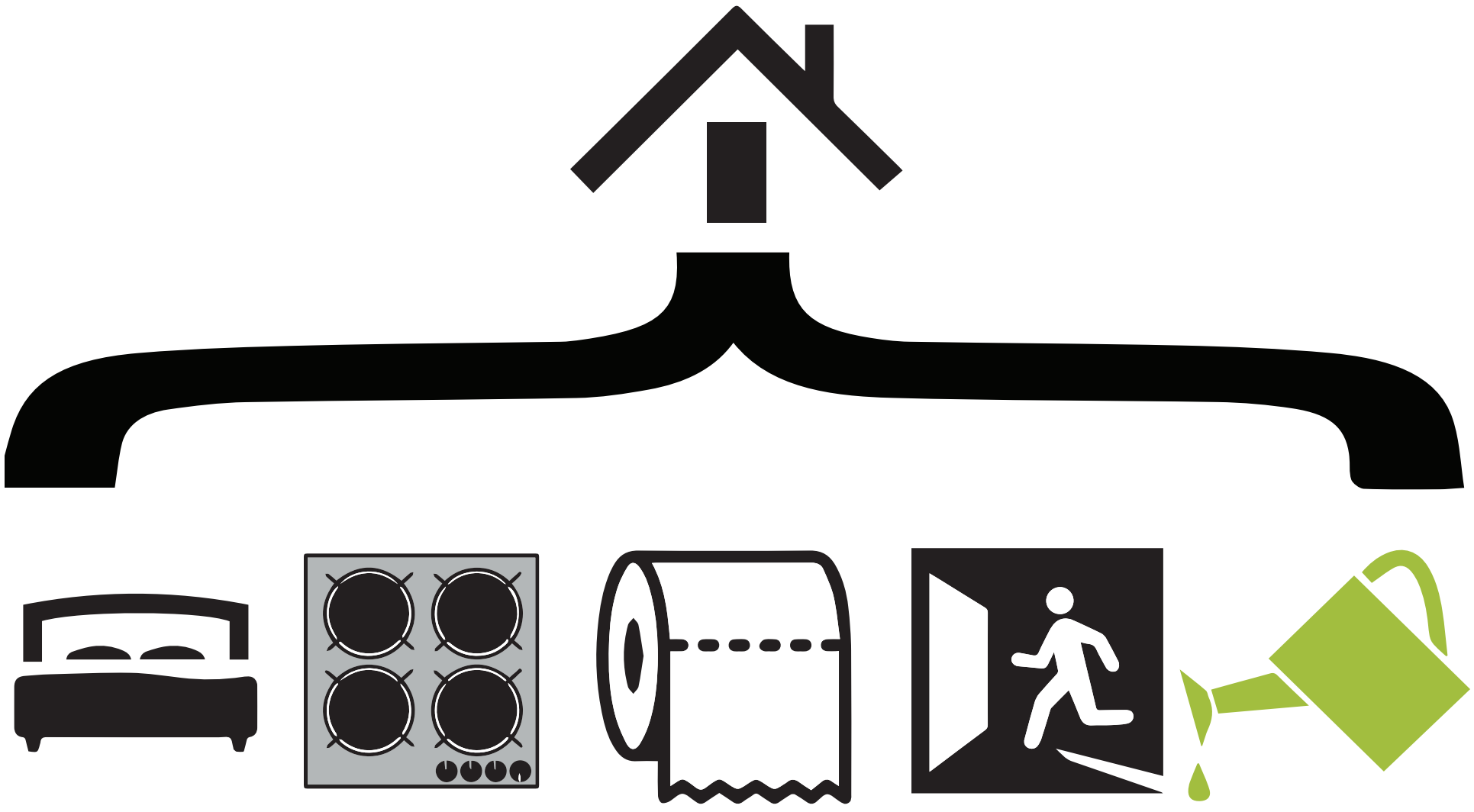
The following project takes place in a projected future where urban farming is considered a norm. The project analyzes spatial implications of such a condition.

Chapters below describe:

WHY: The Narrative
WHERE: The Site
WHAT: The Content
HOW: The Method

CLAIM:

IN THE PROJECTED URBAN WORLD AGRICULTURE WILL BE CODIFIED.



WHY

GLOBAL

Population increase
Increase in demand
Status of agricultural land
Environmental factors

LOCAL

U.S. Land use
Import/Export

POPULATION GROWTH

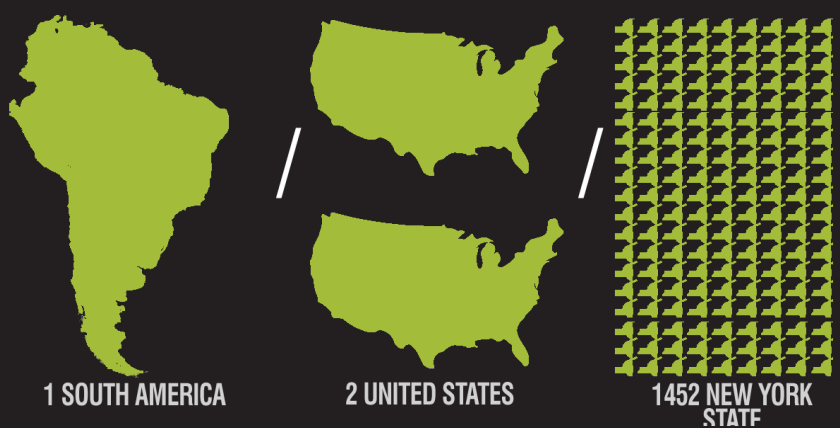
2014 POPULATION:

6 BILLION PEOPLE

47% RURAL

53% URBAN

AGRICULTURAL LAND NECESSARY FOR: 6 BILLION PEOPLE



1 SOUTH AMERICA

2 UNITED STATES

1452 NEW YORK STATE

2050 POPULATION:

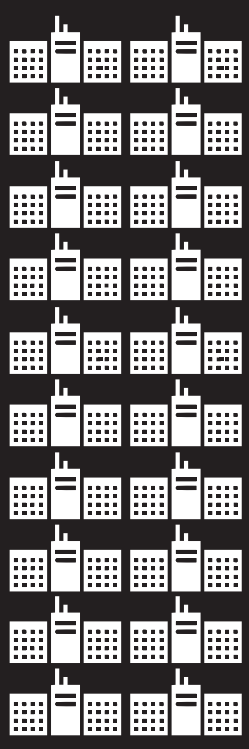
9 BILLION PEOPLE

20% RURAL

80% URBAN

120% of

30%



5%

A new urban phenomena where architecture and agriculture coexist in a symbiotic relationship is called a SITOPIA. This project is about analyzing and systematizing Sitopia. The word sitopia is derived from ancient Greek and is translated as sitos; food, grain, and topos; place: Food Place. In order to understand such condition, one needs to refer to the main drivers that has initiated it.

Population growth is the starting point for building a narrative for Sitopia. In 2014 global population is 6 billion people 47% residing in rural and 53% residing in urban zones.*1 According to Robert B. Potter and Sally Lloyd-Evans in their book “the City in the Developing World”, the percentage of urban population is expected to increase from 29% in 1960 to 61% in 1925. Between the years 1960 and 1970 the worlds urban population has increased by 16.8%. Another 16.9% was added the following decade.*2 In 2050, the population is expected to rise by 3 billion people. Amongst 9 billion people 20% is expected to reside in rural areas while 80% will be city dwellers. *1

According to the data taken from”Living in the Endless City”, even though cities host more then half of the population, the urban built up areas take up 2% of Earth’s surface area. While generating up to 80% of the economic output, cities produce 75% of CO2 emission. Furthermore, 60-80 % of energy consumption occur in the cities globally. *3

In order to fully grasp the narrative Sitopia situates itself in, it is important to go over the pull factors cities embody. Urban areas have better infrastructure, providing better services such as healthcare and education. Moreover, cities bring “people and goods together”, creating job opportunities and initiate sharing of information. As the density increases within cities, so does the population of urban poor. Between the years 1993 and 2002 the population of urban poor increased by 50 million while the population of rural poor decreased by 150 million. *3

Is urbanization a finite process? According to the World Bank, while the population of the cities in the developing world had increased by about 5% between 1990 and 2000, the built up environment expanded by 30%. Furthermore, while the built-up areas of the cities have enlarged as a whole, the ‘built up area per person also increased by 2.3% in industrial cities’ (14); suggesting cities are growing not only in population but also in size.*3

What are the effects of urbanization to the food supply? Today, in order to feed 6 billion people, agricultural land necessary for production is the size of South America. That is two times the size of United States and 1452 times the size of New York State. What happens when the population increases? How much more agricultural land will be necessary? To sufficiently feed 9 billion people, there needs to be 20% more of South America dedicated for agricultural production. That is the size of Brazil. *1

*1 Despommier, Dickson D. The Vertical Farm: Feeding the World in the 21st Century. New York: Thomas Dunne /St. Martin’s, 2010. Print.

*2 Potter, Robert B., and Sally Lloyd-Evans. The City in the Developing World. Harlow, Essex, United Kingdom: Longman, 1998. Print.

*3 Burdett, Richard, and Deyan Sudjic. Living in the Endless City: The Urban Age Project by the London School of Economics and Deutsche Bank’s Alfred He

ARABLE LAND
A GLOBAL OUTLOOK

Table 1.1: Food consumption per capita

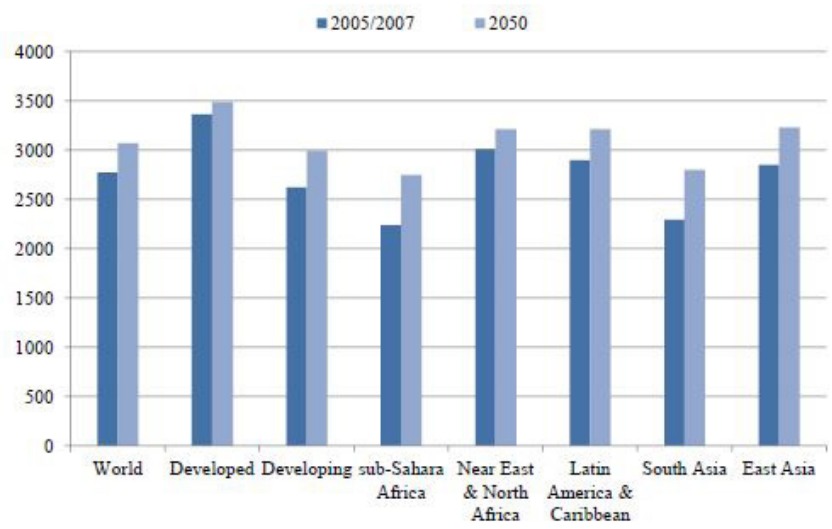


Table 1.2: Quality of arable land available

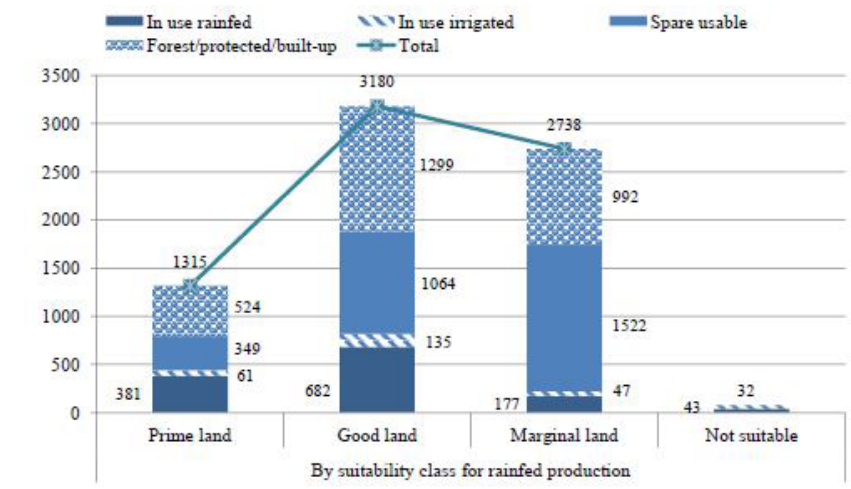


Table 1.3: Change in use in arable land available

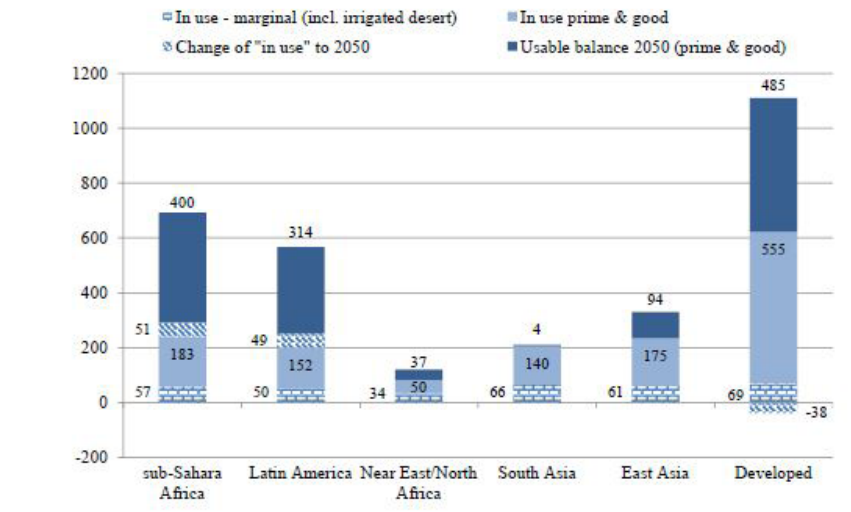
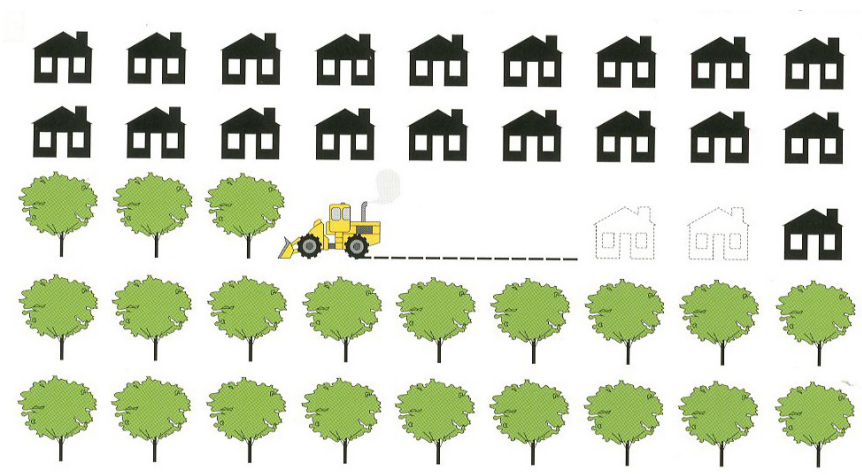


Figure 1.0



Due to the increase in population and urban land-use, first question that arise is, will there be enough arable land to satisfy the projections? With the population increase, food demand per capita has been increasing as well. Today, 28% of the population reside in countries where daily calorie intake is 3,000 kcal per capita.(Table 1.1) This percentage is expected to reach 52%, 4.7 billion people in 2050.(3) In order to satisfy the projected demands, world agricultural production must increase by 70%. Since resources such as land and water are scarce in quality and quantity, there has been concern over achieving the necessary increase in food production.

According to ESA's 'World Agriculture Towards 2030/2050" paper, 7.2 billion hectares (ha) of land receive rainfall to account for varying degrees of agricultural production. Out of the 7.2 billion ha, 1.6 billion ha is already being cultivated, another 2.8 billion is forested, protected or already occupied. 1.5 billion ha of the remaining potential arable land is classified as 'poor quality for rain fed crops,' (10) thus leaving 1.4 billion ha of additional land classified s prime and good land which can be converted into arable land if necessary. (Table 1.2) In order to satisfy the necessary agricultural demand by 2050, arable land must increase by 70 million ha. Even though mathematically it seems like there is no land scarcity, prime and good land is often not available due to lack of infrastructure, geographical locations and diseases. More importantly, most of the additional land is located in thirteen countries; United States included. (11) (Table 1.3) [*4]

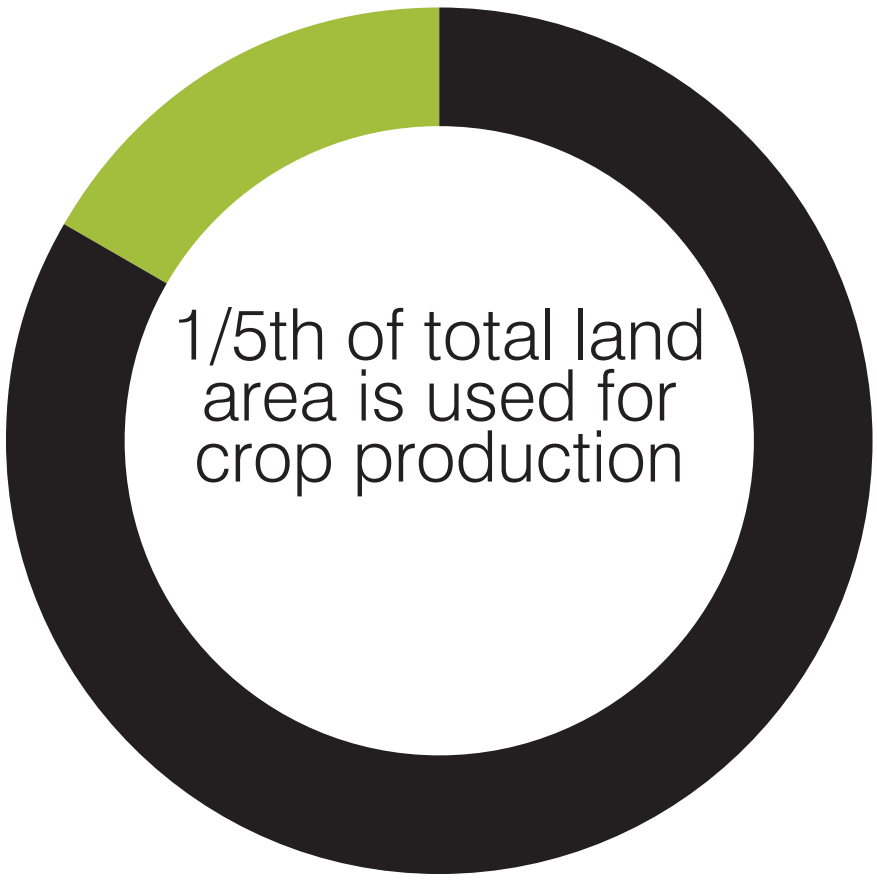
In United States, out of 408 million ha, one fifth of the land is used for agricultural purposes. Even though population and demand had been increasing over the years, the percentage of arable land has not.[*5] In fact, 'land development has quadrupled since 1945', (Figure 1.0) accounting for the conversion of both arable and non arable land. (20)[*6] In other words, even though United States is one of the thirteen countries where spare prime and marginal land for agriculture is located, these zones are not converted into arable land. Not only, the necessary conversion is not taking place in order to globally satisfy the projected demand for 2050, but also current farmland are being developed. According to EPA, 3,000 acres of farmland is lost every day in the United States. 8% of decrease in farmland has been noted over the last two decades. Through urban expansion and agricultural erosion, relationship between rural and urban has been challenging agricultural production. 'Today, 2/3rds of the total value of U.S. agricultural production takes place in, or adjacent to metropolitan counties.'[*5] Furthermore, 18 % of the farms are located within the urban zones. In other words, proximity of arable land to urban zones is not only a new concept but an economically valued one since majority of the farms already situate themselves close to the urban zones.

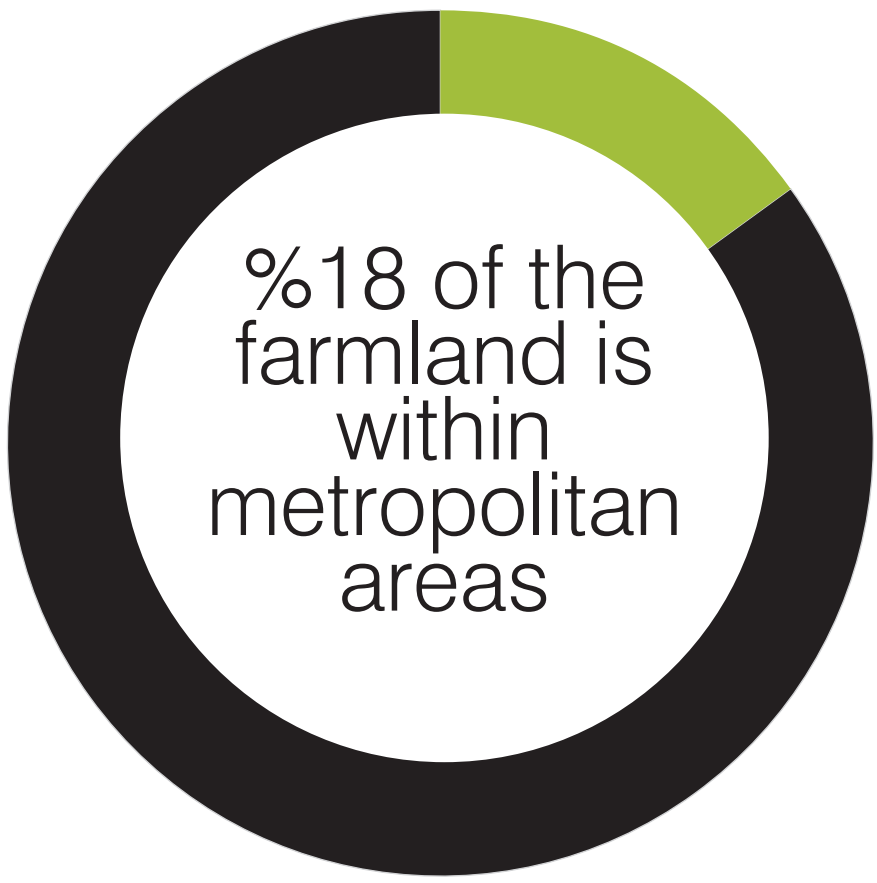
*4 Alexandratos, Nikos, and Jelle Bruinsima. World Agriculture Towards 2030/2050. Working paper no. 12-03. N.p.: n.p., n.d. Print

*5 "Land Use Overview." EPA. Environmental Protection Agency, n.d. Web. 23 Nov. 2014.

*6 Chakrabarti, Vishaan. A Country of Cities: A Manifesto for an Urban America. N.p.: n.p., n.d. Print.

U.S. AGRICULTURAL LAND USE





According to USDA's (United States Department of Agriculture) "Major Uses of Land in the United States" report, published in 2007, cropland in the United States reached its lowest level with a 34 million acres of decrease between the years 2002 and 2007. On the other hand, urban built up areas quadrupled since 1945 while the population has only doubled.(7) Agricultural land near urban areas face land use change challenges since fairly flat land mostly favored for agriculture is also favored for development. *7

Even though increase in urban land use and decrease in agricultural land has been noted above, it is important to reiterate that while agricultural land accounts for 18% of the total land in United States, urban land accounts for only 3%. *7

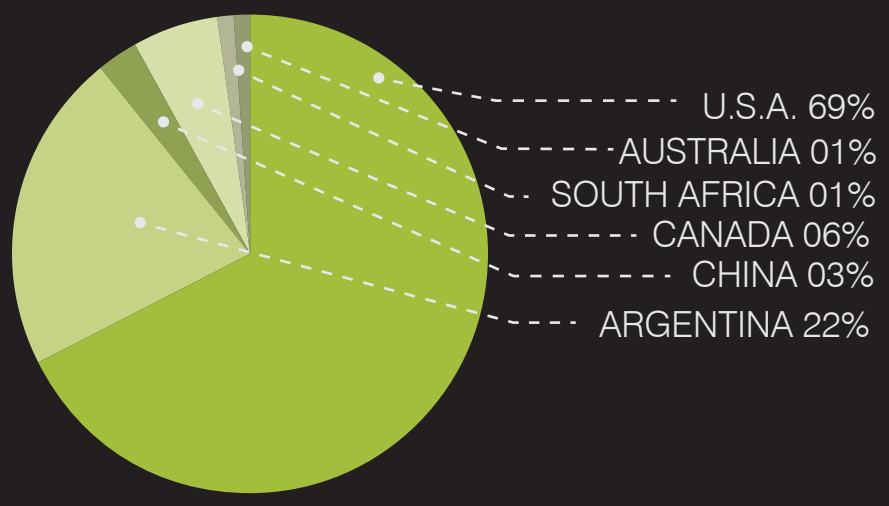
In brief, as the population increases globally so does the demand for food production not only in terms of satisfying the increased population but also increased calorie intake per capita. Even though globally there is enough spare land to use for agricultural purposes, the spare land is not necessarily being converted to arable land. In fact, even though United States is one of the thirteen countries which has spare land needed to be converted to arable, is facing decrease in agricultural land use. One might argue, decrease in agricultural land use is encompassed with technological advancements; thus not effecting the crop production.

*7 Nickerson, Cynthia, Robert Ebel, Allison Borchers, and Fernando Carriazo. Major Uses of Land in the United States, 2007, EIB-89, U.S. Department of Agriculture, Economic Research Service, December 2011.

USE OF TECHNOLOGY

machines	crops	infrormation
autonomous	biologicals	apps
electric-driven motors	brown revolution	big data
geofencing	drought tolerant hybrids	cloud computing
hybrid tractors	genome sequencing	farm managment
nutrient sensors	instect resistence	information systems
quad tracks	micronutrients	telematics
variable rate irrigation	polymers	
	weed resistence management	

COUNTRIES USING GMO'S



Advancement in technology is not only shown as a solution for farmer's population decrease but also o decrease in arable land. From the tools to systems to crops themselves, use of technology has been shaping contemporary farming in order to increase not only the profitability but also productivity and efficiency. From advanced irrigation systems to information gathering, due to technology one can argue increase in demand can be satisfied even with the decrease in arable land.

One can classify type of technology used in farming in three categories: machines, crops and information. While advancements in machinery decreases if not eradicates the need for human labor, advancements in information leads to ease in management and improvement of the cropland. For example, while autonomous tractors function without a human driver through radio navigation system, hybrid tractors cut fuel costs through utilization of hydrogen power. Gadgets such as nutrient sensors enable farmers to detect nutrient levels in crops. On the other hand, advancement in information sharing and storing through interfaces such as big data and cloud computing provide ease of access to means and methods, production and profit rates previously utilized by the farmers.

The most controversial advancements are the ones involving crops. Agriculture can be classified into two groups: conventional and organic. Conventional agriculture, sometimes referred as the 'Green Revolution', is utilization of synthetic inputs such as pesticides and mono cultures in order to increase productivity and profitability. On the other hand, Organic Agriculture is defined as a "holistic system that 'enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity" (Scialabba, 2003)' (22)*[9] . Organic Agriculture is a non-chemical, sustainable method of agricultural production. Use of technology involving crops; therefore, is mostly utilized in conventional agriculture, In order to build the narrative for Sitopia, one needs to choose type of agricultural method that will be utilized.

Since conventional selecting and breeding is not only time consuming but also challenging; scientists have been trying to come up with ways to improve the process. Through genetic modification of crops, introducing or eradicating certain genomes;therefore, traits of crops are easily assessed without waiting for the maturity of the plant. In return, productivity and profitability of crops increase.*[9] Since agriculture is the main reason behind deforestation, GMO supporters argue that due to the increase in productivity, expansion of arable land will be deemed unnecessary; thus GM crops will be aiding in forest conservation. However, studies conducted in Argentina (2005) indicate that even though initial deforestation was due to black bean harvesting during 1970's and increased soy bean prices in 1980's; cultivation of GM crops accelerated land use change; leading to further deforestation. Similar deforestation issues followed by the introduction of GM crops were also observed in other Latin American countries (23). In other words, even though in theory GM crops prevent the land use change, observations seems to indicate otherwise in certain parts of the world. *[9]

Another concern is habitat destruction and loss of biodiversity due to the cultivation of GM crops. "Utilization of high yielding crops" have been preventing "traditional crop variety" to occur. In fact, according to an information paper published by IUCN, the World Conservation Union, "at least 1,350 varieties face extinction, with an average of two breeds being lost each week (FAO, 2003)"(23). Furthermore, insect resistant crops might lead to insects building resistance; thus leading to excessive use of pesticides. A study shows that minimum of 15 species of weed in the U.S. has built resistance; thus had required more pesticides(26). Another issue associated with GM crops is regarding to Freshwater systems. Even though some GM crops that can tolerate drought are being cultivated; they are not yet on the market. The ones that are being commercially cultivated, rely on the utilization of extensive irrigation systems; thus draining wetlands; causing pollution due to synthetic inputs(23).*[9]

GMO's are extensively being cultivated in the U.S. (69%), followed by Argentina(22%), Canada(6%), China(3%), Australia and South Africa(1%). However, in Europe, there are multiple GMO-free zones (more then 100 regions and more then 3500 subregions) that restrict cultivation of GMO crops. Moreover, some developing countries such as Zambia, refuse GMO's in order to remain within the European market.

In brief, the use of technology not only lessens the human labor, thus making up for the decrease in farmer population; but also promise high returns, indicating the change in land use is non problematic.

8* http://www.ers.usda.gov/topics/rural-economy-population/population-migration.aspx#map
9* http://cmsdata.iucn.org/downloads/ip_gmo_09_2007_1_.pdf

CONVENTIONAL VS. ORGANIC AGRICULTURE

Figure 1.2: Arable land cultivated by GM crops in the U.S.

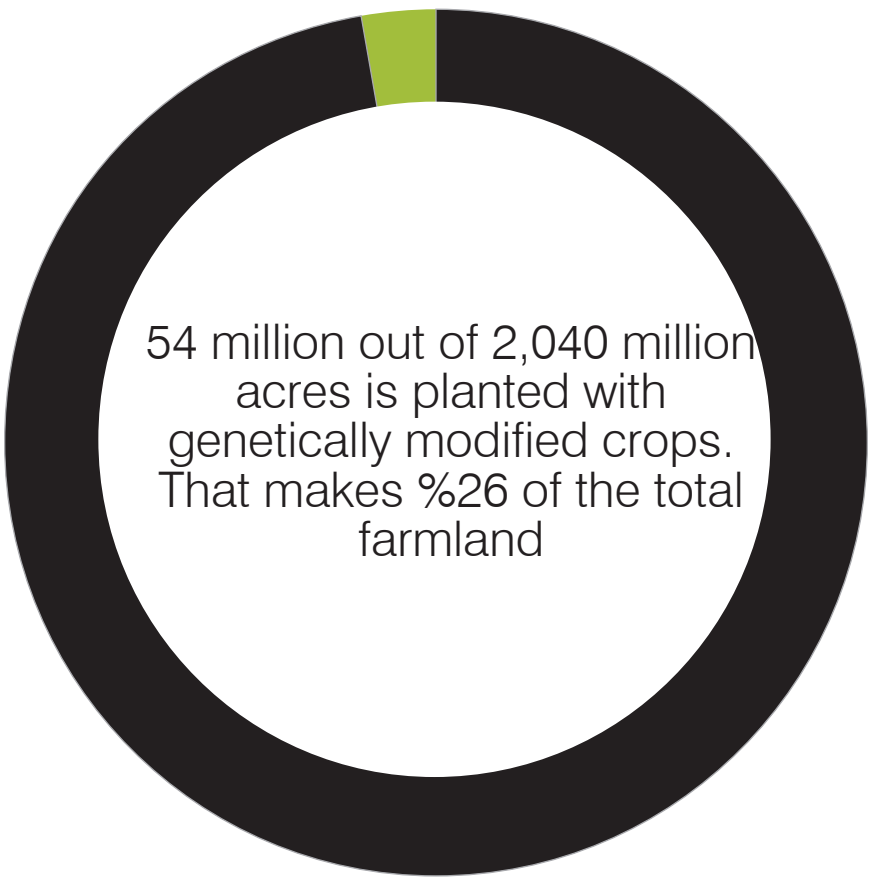
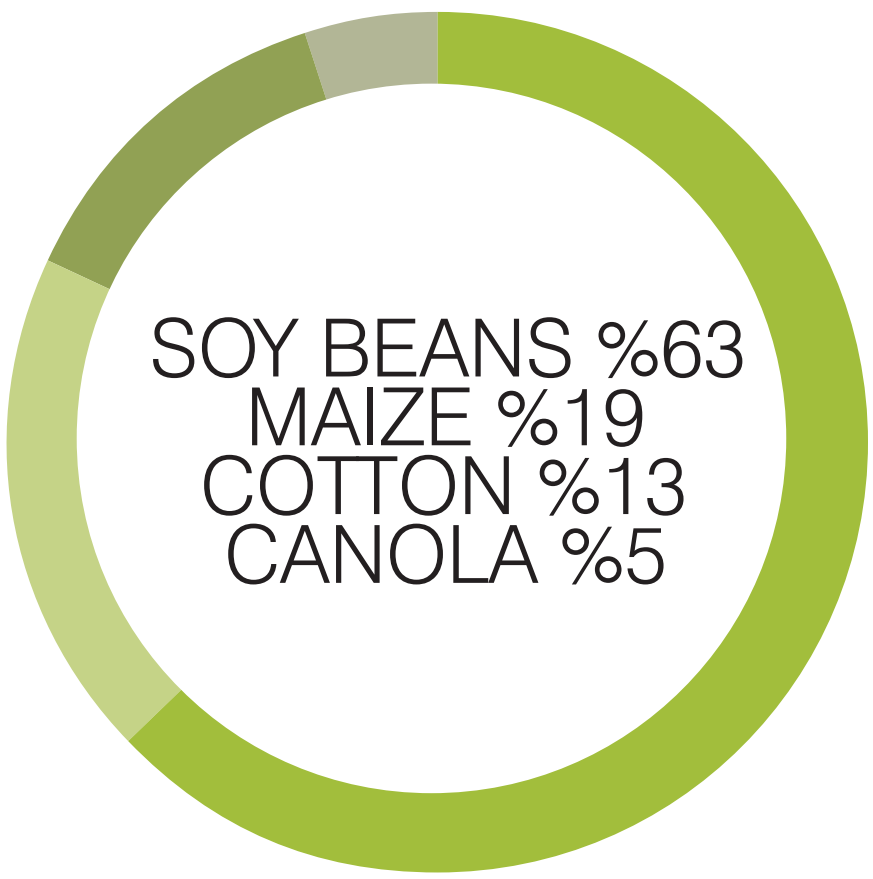


Figure 1.3: Type of GM crops cultivated in the U.S.



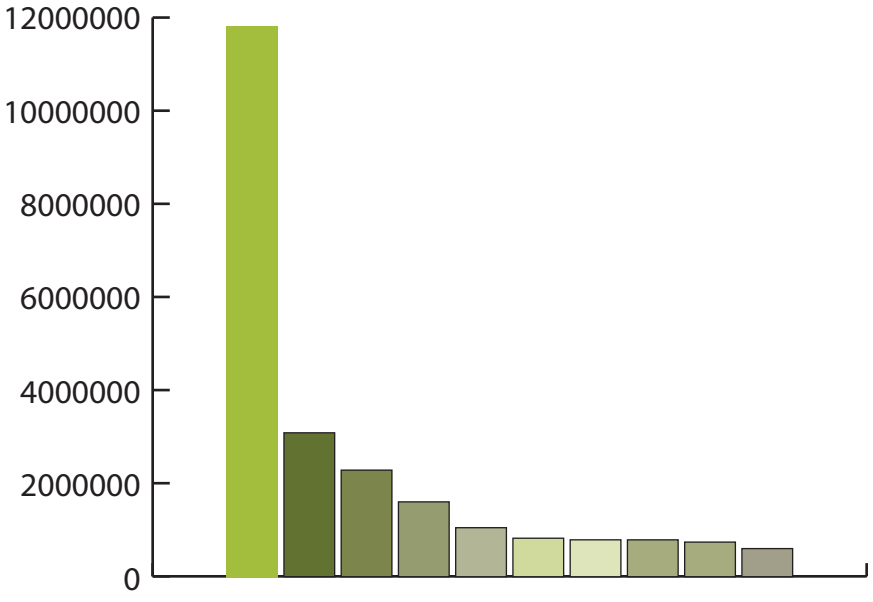
It is equally important to understand what types of crops are mostly genetically modified. Even though 26% of the U.S. farmland is cultivated with GMO's, these are in descending order soy beans, maize, cotton and canola.*10

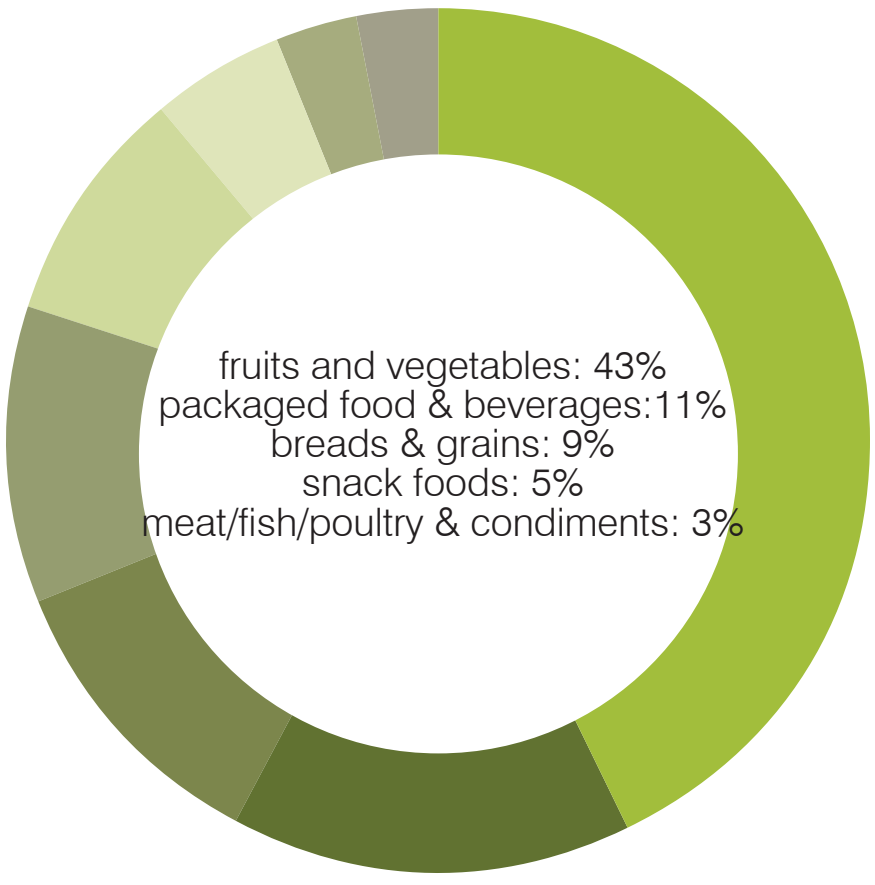
On the other hand, according to the "the World of Organic Agriculture- Statistics and Trends 2007" by Helga Willer and Minou Youssefi" Organic agriculture is on the rise globally. U.S. not only comes fourth in area of farmland dedicated to organic agriculture, but also shows quadrupled demand for organic produce. It is important to note; however, the high number of organic farmland is due to U.S. having a larger landmass in comparison. Even with the increased demand, only 0.5% of the total farmland is dedicated to organic agriculture. *11

Due to unintentional environmental and health concerns evolving around GMO's, the narrative for Sitopia formulates around organic agriculture. Even though benefits of science in every aspect of life is undeniable, in order to emphasize the sustainable portion of the project, Sitopia will follow the holistic approach.

Since the type of agriculture is now clarified, the question becomes what type of produce will the project focus on. According to the data gathered from USDA, the sales of organic products in 2012 was $28 billion and it is expected to rise to $35 billion in 2014. Amongst the organic produce, 43% is organic fruits and vegetables, 15% dairy products, 11% packaged and prepared food and beverages, 9% breads and grains, 5% snack foods and; meat, fish, poultry and condiments 3%. Since the highest demand for organic produce is in fruits and vegetables this project will focus on them. The next step will be to analyze fresh fruit and vegetable retail and farm availability; U.S. import and export statistics and finally the cost. Figure 1.4 studies retail and farm availability of each vegetable according to its demand. It concludes that every one of seven truckloads of fruits and vegetables are wasted from farm to market.

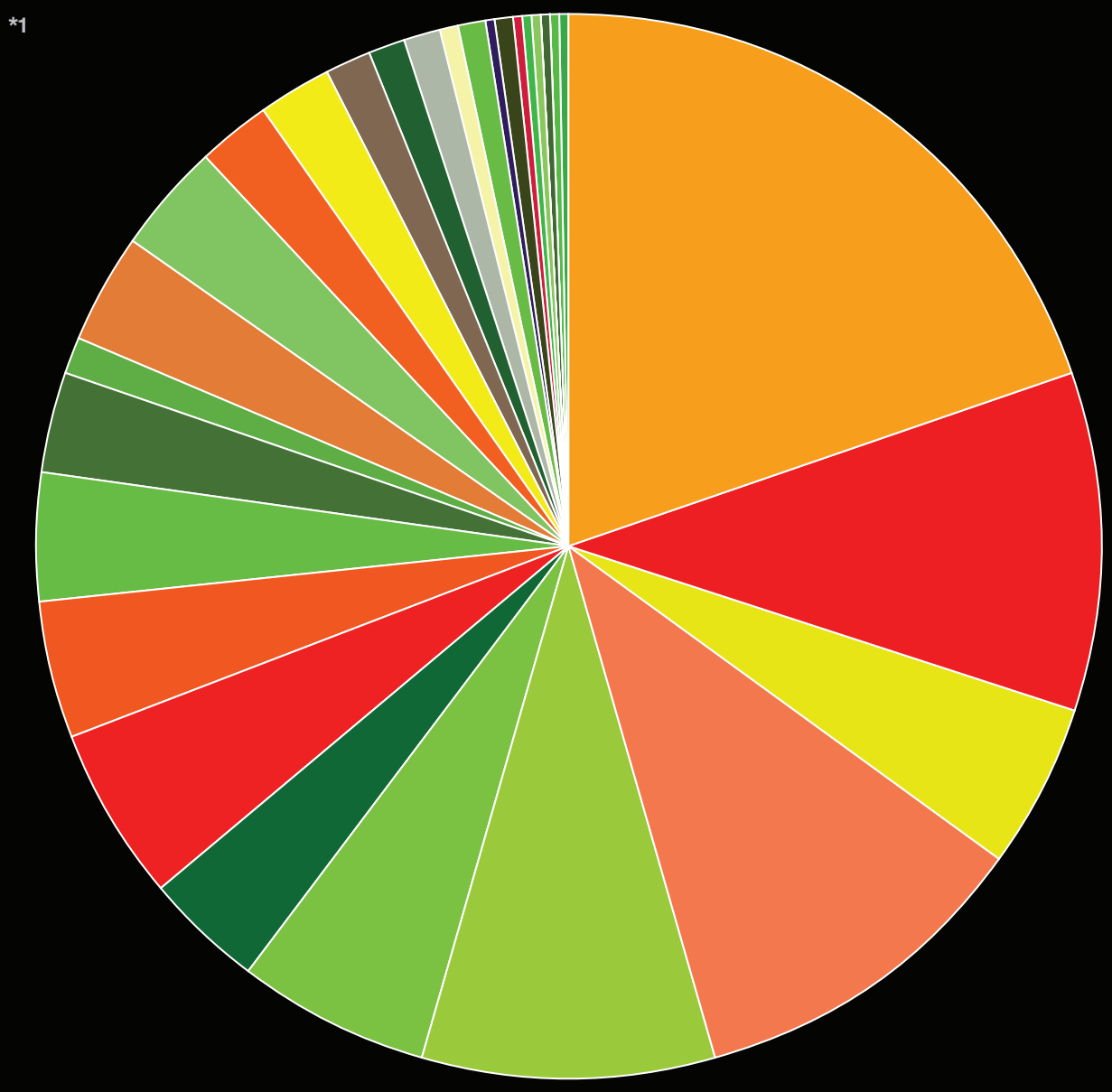
*11 http://orgprints.org/10506/1/willer-yussefi-2007-p1-44.pdf
*12 http://www.ers.usda.gov/topics/natural-resources-environment/organic-agriculture/organic-market-overview.aspx





FRESH VEGETABLES RETAIL AVAILABILITY

*1



retail weight (lb per capita): 34.17
farm weight (lb per capita): 35.5

retail weight (lb per capita): 17.73
farm weight (lb per capita): 20.4

retail weight (lb per capita): 8.51
farm weight (lb per capita): 9.8

retail weight (lb per capita): 18.67
farm weight (lb per capita): 19.8

retail weight (lb per capita): 14.2
farm weight (lb per capita): 15.00

retail weight (lb per capita): 9.98
farm weight (lb per capita): 11.5

retail weight (lb per capita): 6.23
farm weight (lb per capita): 7.7

retail weight (lb per capita): 9.12
farm weight (lb per capita): 11.7

retail weight (lb per capita): 7.38
farm weight (lb per capita): 7.8

retail weight (lb per capita): 6.70
farm weight (lb per capita): 6.94

retail weight (lb per capita): 5.14
farm weight (lb per capita): 6.3

retail weight (lb per capita): 1.76
farm weight (lb per capita): 2.0

retail weight (lb per capita): 5.66
farm weight (lb per capita): 6.9

retail weight (lb per capita): 5.81
farm weight (lb per capita): 6.0

retail weight (lb per capita): 4.04
farm weight (lb per capita): 5.3

retail weight (lb per capita): 3.88
farm weight (lb per capita): 4.7

retail weight (lb per capita): 2.35
farm weight (lb per capita): 2.8

retail weight (lb per capita): 1.62
farm weight (lb per capita): 1.5

retail weight (lb per capita): 1.89
farm weight (lb per capita): 2.3

retail weight (lb per capita): 1.2
farm weight (lb per capita): 1.23

retail weight (lb per capita): 1.24
farm weight (lb per capita): 1.4

retail weight (lb per capita): 0.81
farm weight (lb per capita): 0.9

retail weight (lb per capita): 0.56
farm weight (lb per capita): 1.00

retail weight (lb per capita): 0.4
farm weight (lb per capita): 0.54

retail weight (lb per capita): 0.52
farm weight (lb per capita): 1.5

retail weight (lb per capita): 0.36
farm weight (lb per capita): 0.4

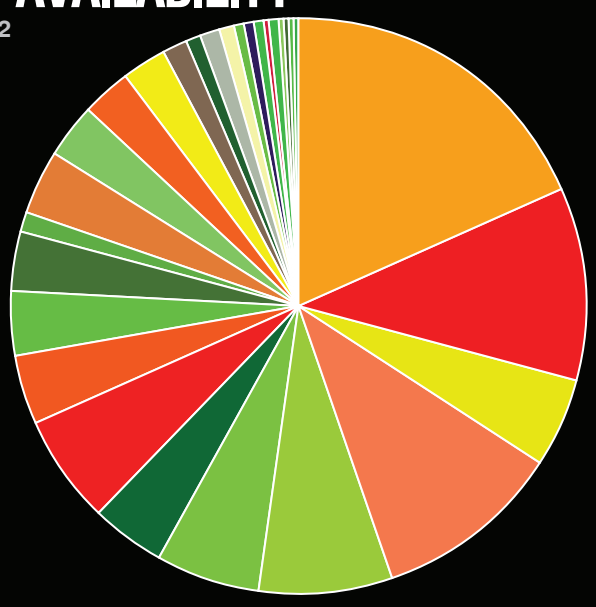
retail weight (lb per capita): 0.34
farm weight (lb per capita): 0.4

retail weight (lb per capita): 0.32
farm weight (lb per capita): 0.4

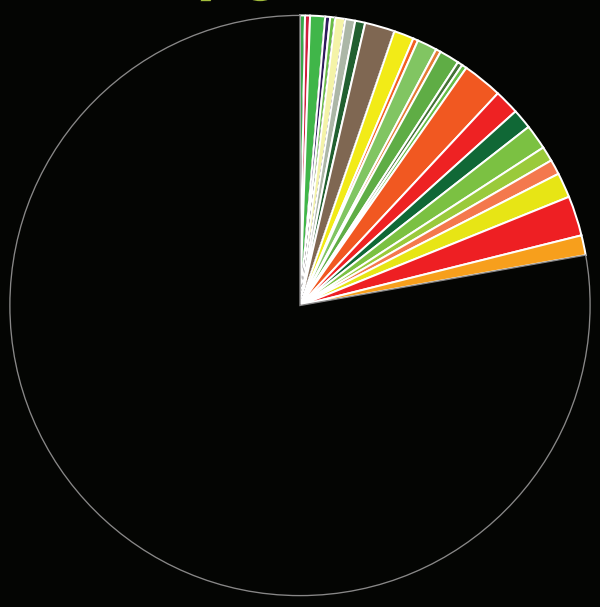
retail weight (lb per capita): 0.26
farm weight (lb per capita): 0.4

FRESH VEGETABLES FARM AVAILABILITY

*2



WASTE %22



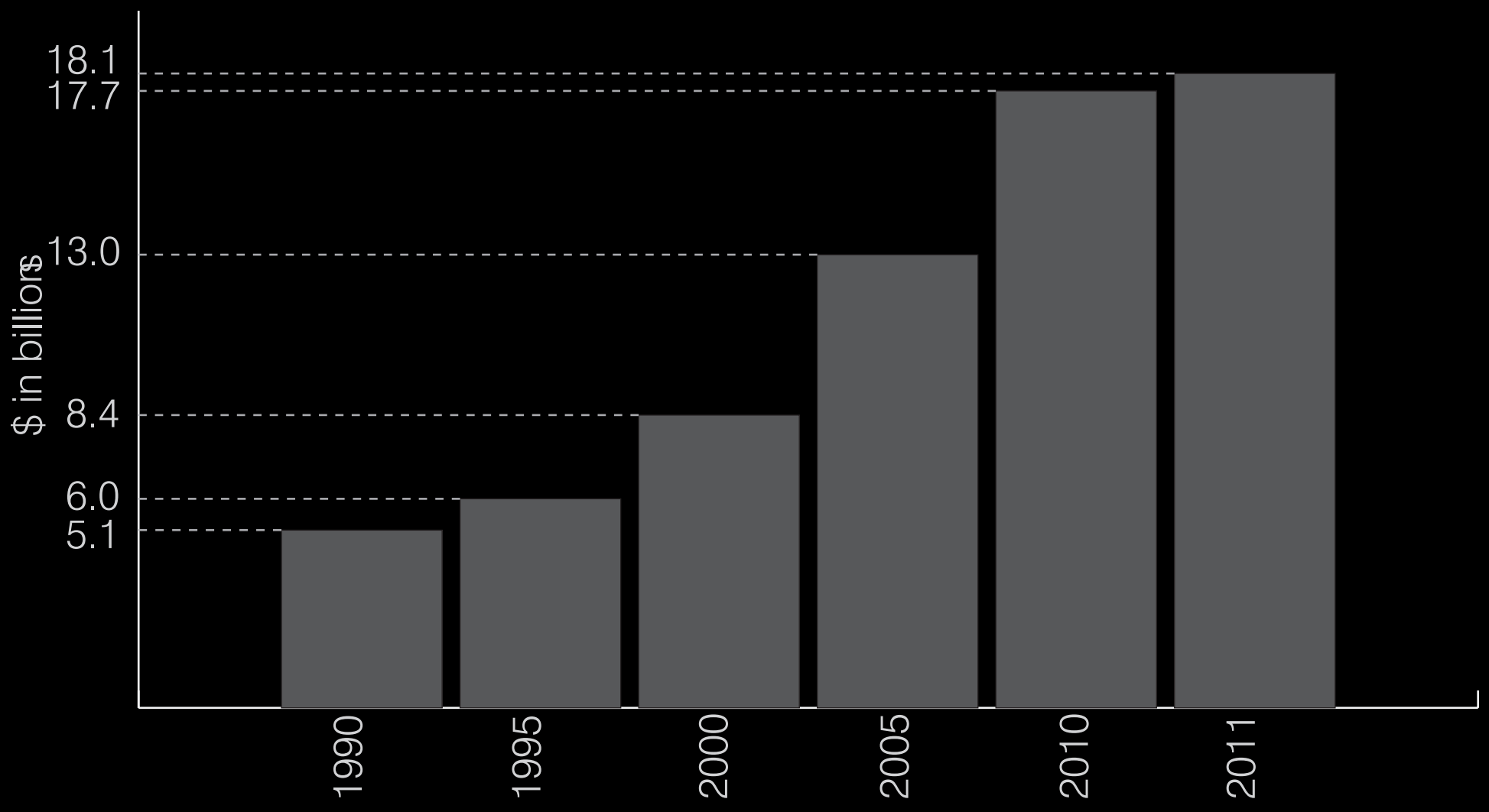
*3

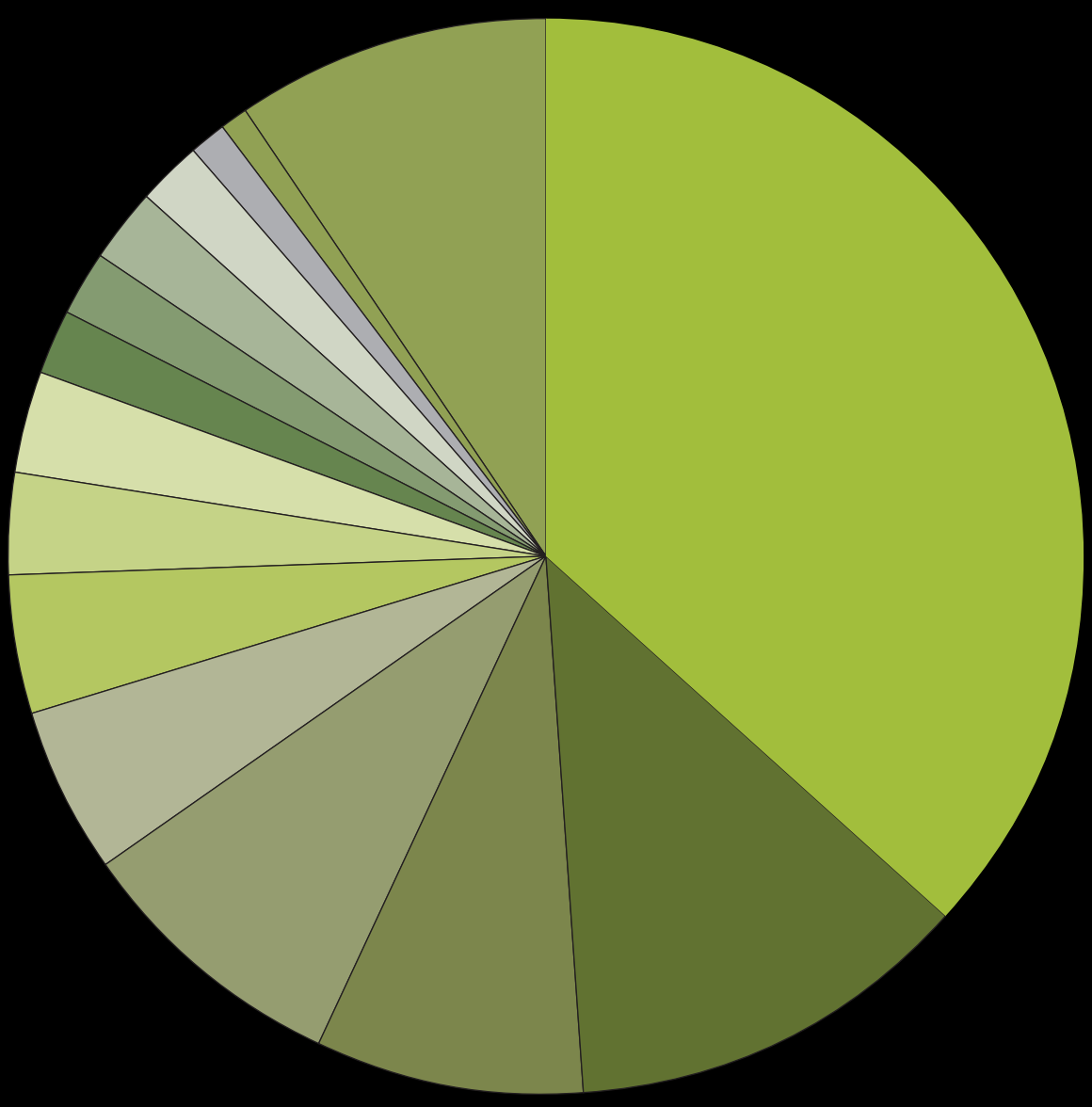
*4

1 of every 7 truck of food is wasted upon delivery to supermarket

1-2. http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system/.aspx
3-4. http://www.nrdc.org/food/files/wasted-food-ip.pdf

U.S. IMPORTS
FRUITS AND VEGETABLES



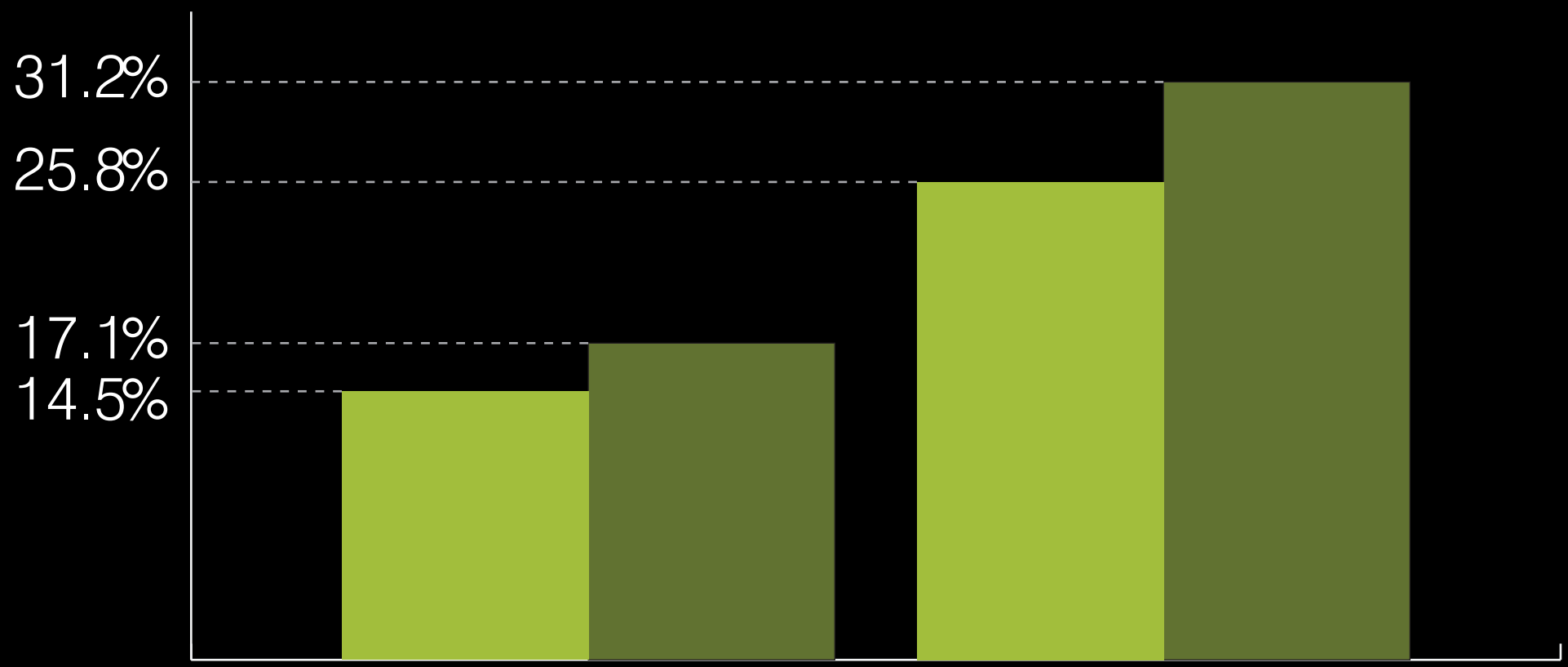


MEXICO 36%
CANADA 12%
CHINA 8%
COSTA RICA 5%
GUATEMALA 4%
PERU 3%
ECUADOR 3%
ARGENTINA 2%
THAILAND 2%
BRAZIL 2%
SPAIN 2%
HONDURAS 1%
PHILIPPINES 1%
COLOMBIA 1%
OTHER 9%

Source: CRS using data in the U.S. International Trade Commission's Trade DataWeb database. Includes fresh and processed products (HTS categories 07, 08, and 20), excluding nut products (HTS 801, 802, 2008.11, and 2008.19). Totals may not add due to rounding.
a. Based on compound annual rate of growth, or the year-over-year growth rate, over period.

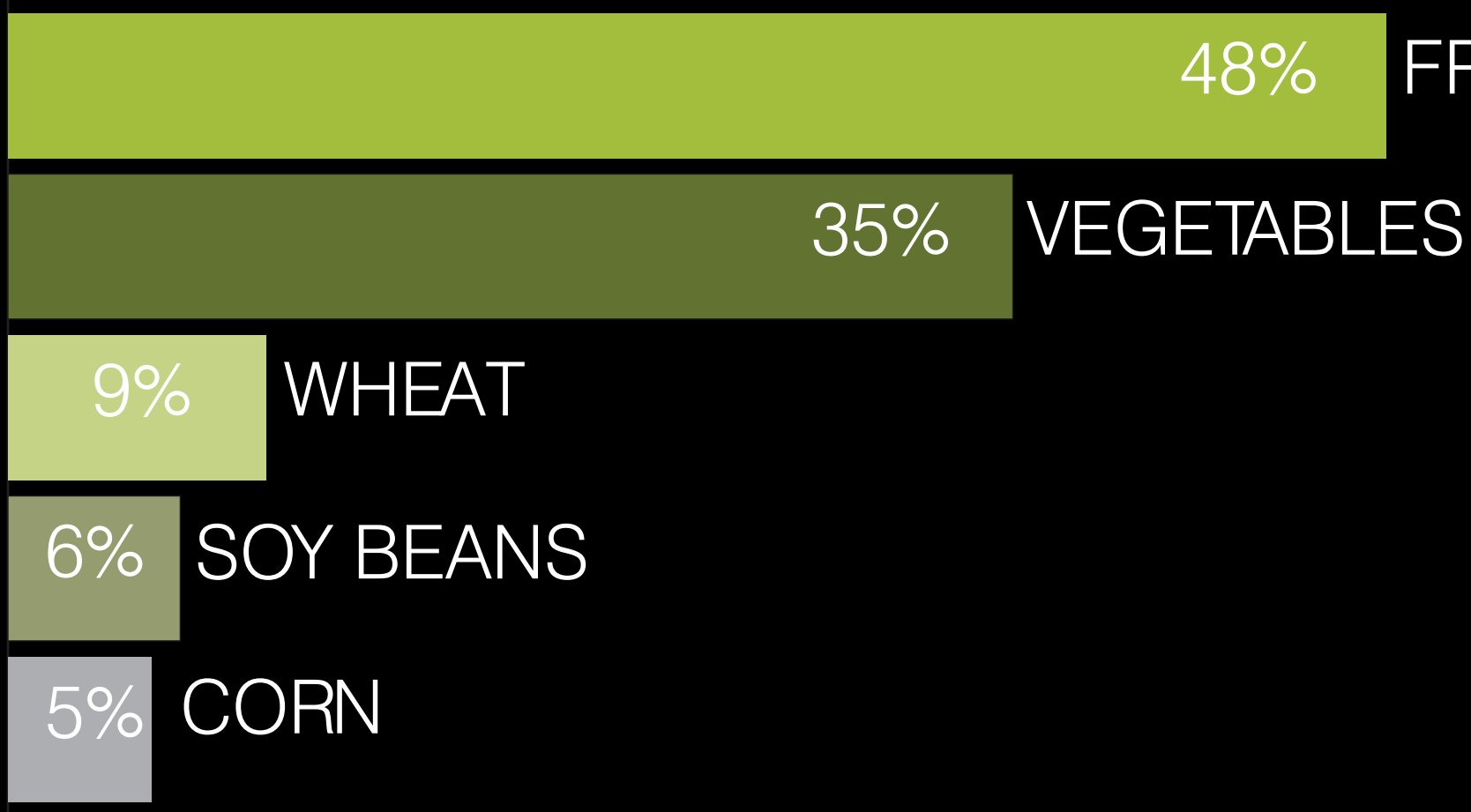
FRUITS AND VEGETABLES
w|o NAFTA

INCREASING DEMAND FOR FRUITS AND VEGETABLES



DOMESTIC PRODUCTION X3

LABOR COST ASSOCIATED WITH PRODUCE.



FRUITS AND VEGETABLES
w|o NAFTA

In order to fully construct the narrative, this part analyzes the demand, production, import and export of fresh fruits and vegetables in the U.S. According to the report “No Longer Home Grown” by Stephen Bronars, for the Partnership for a New American Economy and the Agriculture Coalition for Immigration Reform; demand for fresh vegetables and fruits have increased form %14.5 to %25.8 in fresh fruits and; from %17.1 to %31.2 in fresh vegetables from 1998 to 2012. Increased demand for fresh fruits and vegetables; however, has not been mirrored in domestic production. In fact, while the fresh fruit consumption increased by %11.3, domestic production had only increased %1.4. Similarly, while the vegetable consumption rose %14.1, domestic vegetable production decreased by %3.5 (5). [*12] The demand for fresh fruits and vegetables has been continuously increasing over the last two decades, as well as the cost of cultivating fresh fruits and vegetables. Because one has to selectively handpick the produce, the use of automated machinery is highly limited. According to data from USDA labor costs for fresh fruit is %48; followed by fresh vegetables %35 (8). In other words, even with the advancements in technology, fresh fruit and vegetable cultivation still depends mostly on human labor.

Increase in fresh fruit and vegetable consumption has reflected on the import/export rate. Since in order to satisfy the increase consumption of fresh fruits and vegetables, U.S. farmers had to grow 6.5 billion pounds of fresh fruits and vegetables; import of fresh fruits and vegetables rose significantly from $5.1 billion in 1990 to $18.1 billion in 2011. According to “the U.S. Trade Situation for Fruit and Vegetable Products” written by Renée Johnson for the Congressional Research Service, $11.2 billion trade deficit is recorded.

With NAFTA, (North American Free Trade Agreement), tariffs on agricultural produce between the U.S., Canada and Mexico were uplifted; thus enabling Mexico and Canada to become major fresh fruit and vegetable exporters. Today, majority of fresh fruits and vegetables are imported from Mexico, %36, followed by Canada, 12%.(3) [*13]

Some of the leading produce imported from Mexico are: tomatoes, avocados, peppers, grapes, cucumbers melons, berries, onions, asparagus, lemons, broccoli, cabbage, lettuce, celery, squash and spinach. Potatoes, tomatoes, peppers, cranberries, cucumbers, mushrooms, beans, carrots, cauliflower, and asparagus are main products imported from Canada.

In a context where, NAFTA is no longer in place, and the importing of fresh fruits and vegetables is highly costly; thus not economically feasible, U.S. would have to triple its domestic production according to todays population and demand rate. Since population and demand are expected to increase in the future, the production of specialized crops would also have to be increased.

Sitopia takes place in a context where production of fresh fruits and vegetables previously mostly imported from Mexico and Canada, have to be cultivated domestically. Since the area of arable land is in decrease and the existing agricultural land is mostly cultivated with non specialized produce such as corn, maize and soy beans, production of fresh fruits and vegetables is expected to happen within the boundaries of the built environment.

In brief, the project Sitopia situates itself in a projected future where arable land is continuously decreasing in area, population is growing as well as the demand for organic fresh fruits and vegetables. Without NAFTA in place, where economical and political constraints force major cutback on imported produce, cultivation of fresh fruits and vegetables within the city boundaries become an approved solution. While non specialized produce is still supplied by the conventional agricultural land outside of the city boundaries, specialized produce satisfy a portion of the demand within the city, from designated zones. The intention behind Sitopia is to build off of an existing food system within a city; creating archipelagos of edible zones. Even though in this specific project fresh fruits and vegetables are the main focus; this project should be regarded as a chapter of a larger system; each focusing on different produce, working together.

While this chapter focused on constructing a narrative where certain projections and speculations about a possible future is established in order to position the project; the following chapter focuses on where this particular system can be utilized. It is important to emphasize that the goal behind this chapter is not to prove why Sitopia will occur, but to shine light to the creation of set of circumstances where Sitopia is regarded as a norm.

*12 Bronars, Stephen. No Longer Home Grown. Rep. Ed. Angela Marek Zeitlin. N.p.: n.p., n.d. Print.

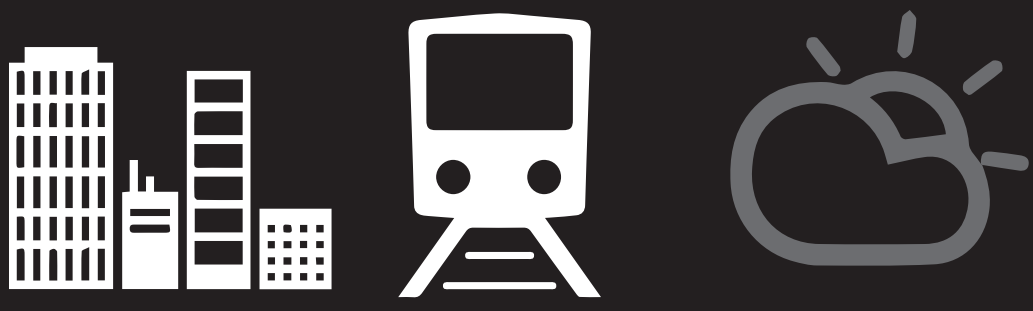
*13 Johnson, Renee. The U.S. Trade Situation for Fruit and Vegetable Products. Rep. no. 7-5700. N.p.: n.p., n.d. Print.

IN THE PROJECTED FUTURE URBAN WORLD WHERE NAFTA DOESN'T EXIST, FRESH| ORGANIC FRUITS AND VEGETABLES ARE PRODUCED WITHIN THE URBAN REALM. THE GOAL IS TO CREATE A SYMBIOTIC RELATIONSHIP BETWEEN AGRICULTURE AND ARCHITECTURE; ANALYZE HOW SPACES AND TYPOLOGIES ARE CHALLENGED IN ORDER TO ACCOMMODATE FARMING; AND SYSTEMATIZE NEW SPACES THROUGH RESTRUCTURING OF THE CODE.

WHERE

NEW YORK CITY

Why NYC?
Maps
Zone 1: East Harlem
Zone 2: Hell's Kitchen
Zone 3: Alphabet City



HIGH DENSITY

Figure 2.1: Accessibility of programs within the urban *6

Figure 2.2: NYC Taxonomy map by Armelle Caron

As mentioned in the previous chapter, Sitopia is a design of a system which bases itself off of systems that are already in place. In order to reach out to masses; urban environments are selected as appropriate places for Sitopia to be implemented. Even though the goal of this chapter is not to argue why urban environments are selected as suitable; nevertheless, it is important to provide background information that will eventually shine light on the process of zone selection. As figure 2.1 illustrates, urban zones are not only dense in regards to human population; but also dense in terms of program.

Due to the density of people and program;social and economical relationships are overlayed with one another; which then manifests itself within the built environment. As the symbiotic relationships emerge between the people and the program; architecture acts as a catalyst. Sitopia focuses on the role of architecture as an interface between the people and the edibles. As the diagram from “Cities for a Small Planet” by Richard Rogers illustrate, cities today function through a linear process of production, consumption and waste.*14 Even though the main intention behind Sitopia is not to create

*6 Chakrabarti, Vishaan. A Country of Cities: A Manifesto for an Urban America. N.p.: n.p., n.d. Print.

Figure 2.2: Input-output relationships within cities *14

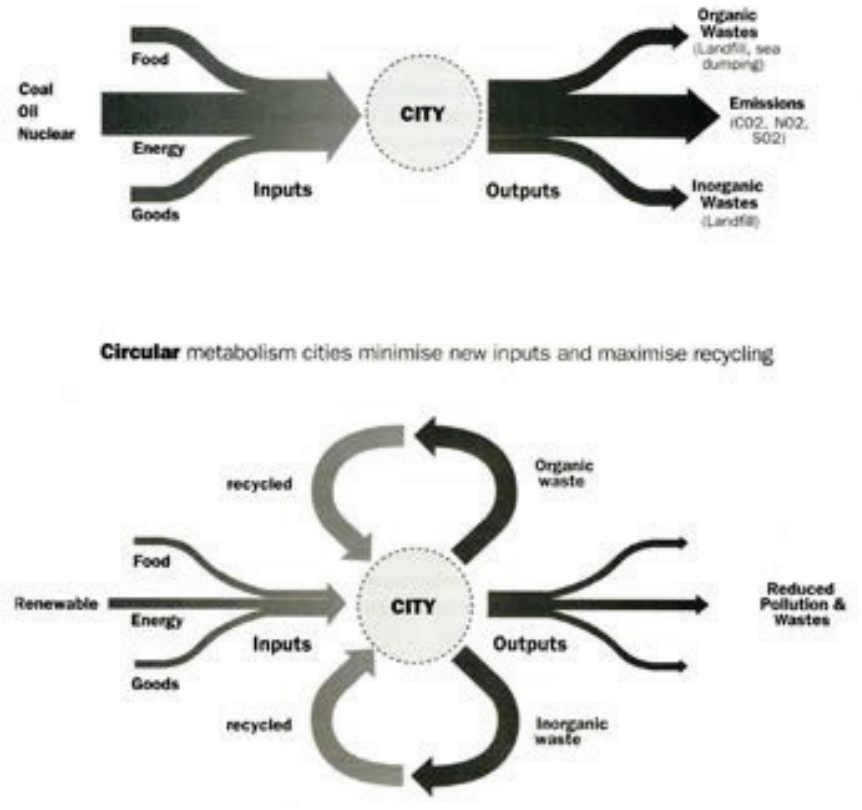


Figure 2.3: Use of agriculture in cyclical sustainable relationship *15

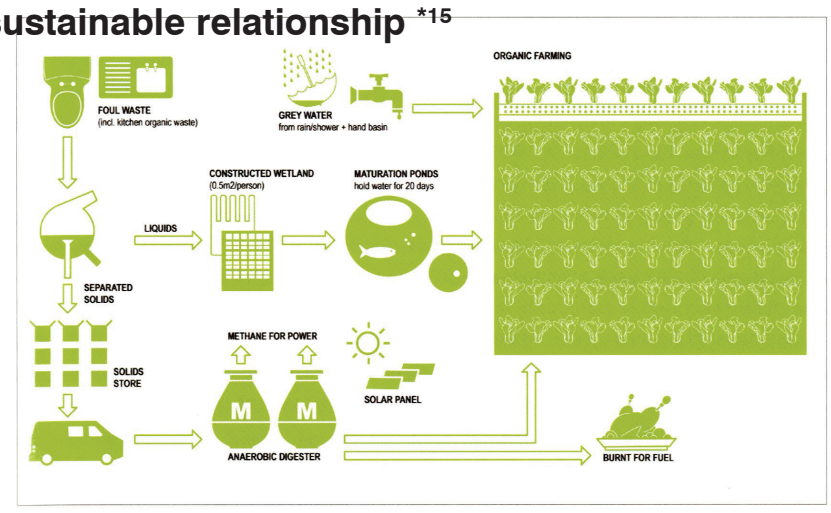
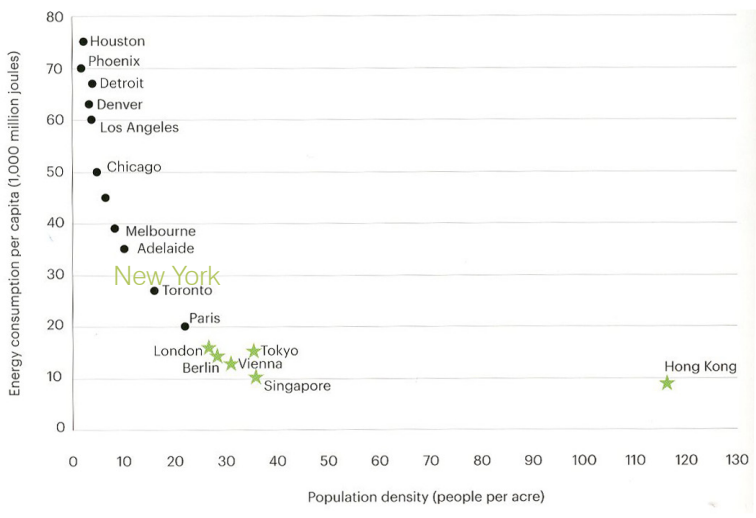
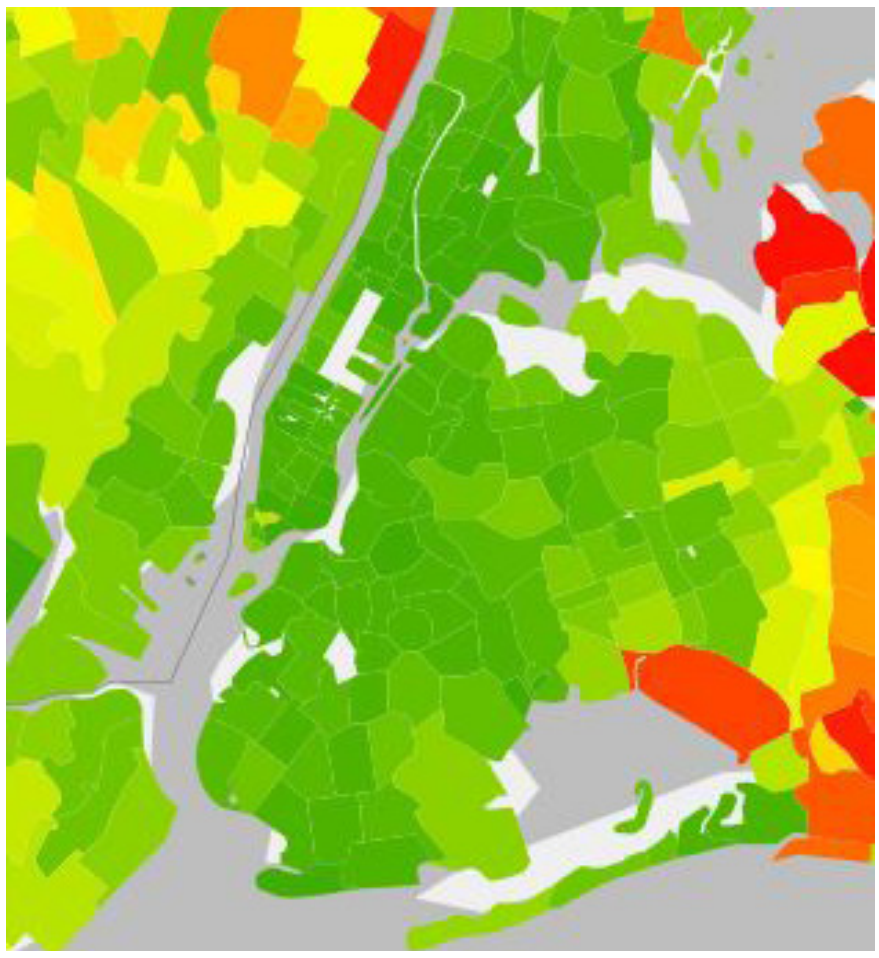


Figure 2.4: Population density and energy consumption *6



NYC CO2 Emission



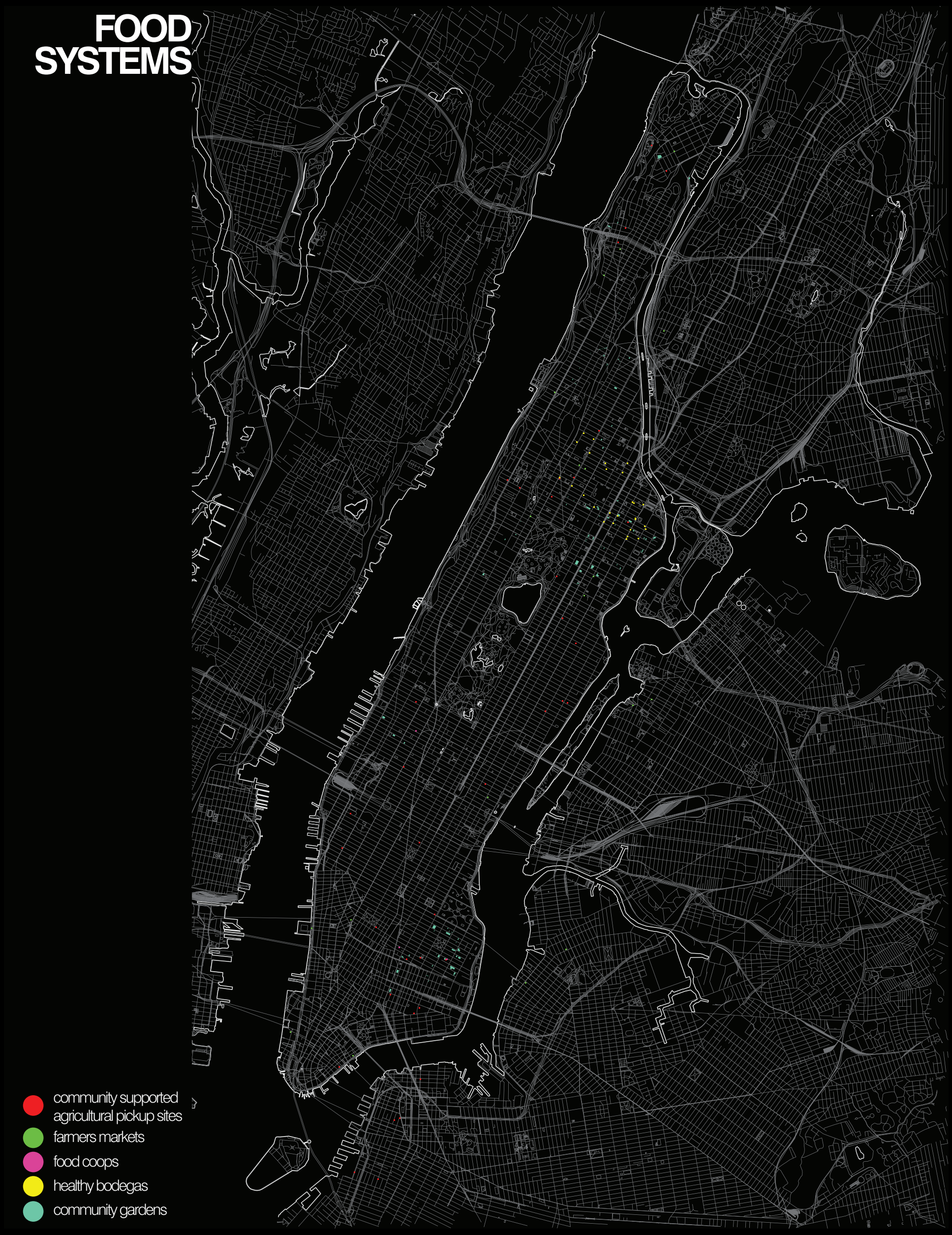
sustainable environments; it is still one of the main priorities to utilize the necessary means and methods in order to reduce environmental impacts through a holistic approach. Due to the compactness of urban districts; carbon emission within cities are considerable lower. While Figure 2.4 illustrates the relationship between population density and energy consumption per capital; Figure 2.5 shows New York City carbon emission rate neighborhood by neighborhood, green being the lowest rate and red being the highest. Even though New York City is not classified as one of the super cities with very low energy consumption per capita such as Hong Kong and Singapore, it is still one of the most energy efficient cities. Due to advanced public transportation system, the use of private vehicles are low; thus impacting the carbon emission.

New York City also have food systems and sustainability plans (Plan NYC 2030) in place as a foundation for Sitopia to situate itself. Through series of mapping exercises; one can discover where food systems and green spaces intersect in order to pin point the most appropriate zones for Sitopia. After subtracting toxic zones from green zones; potential areas for Sitopia will be established.

*14 Rogers, Richard George., and Philip Gumuchdjian. Cities for a Small Planet. Boulder, CO: Westview, 1998. Print.

GREEN SPACES

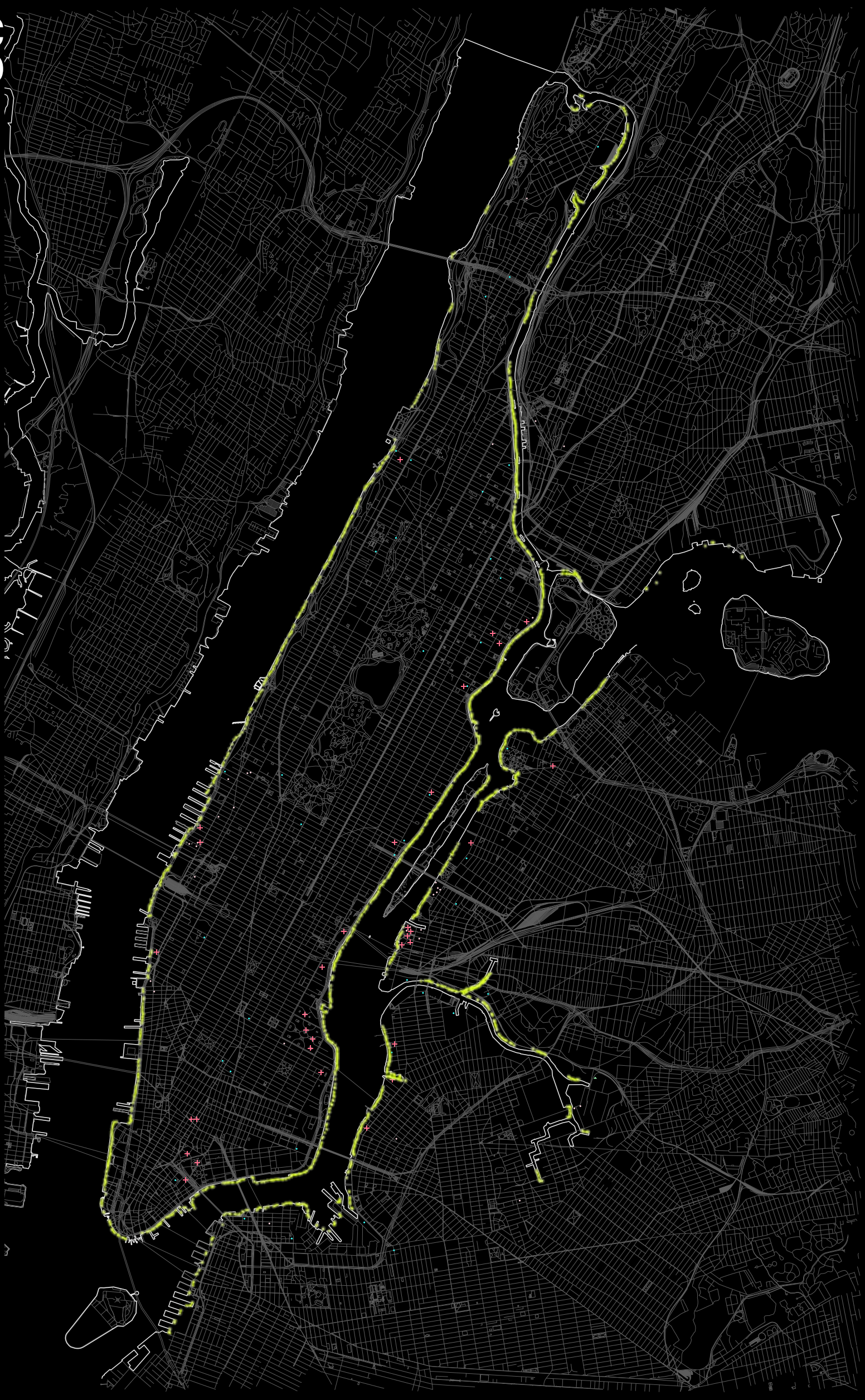
FOOD SYSTEMS



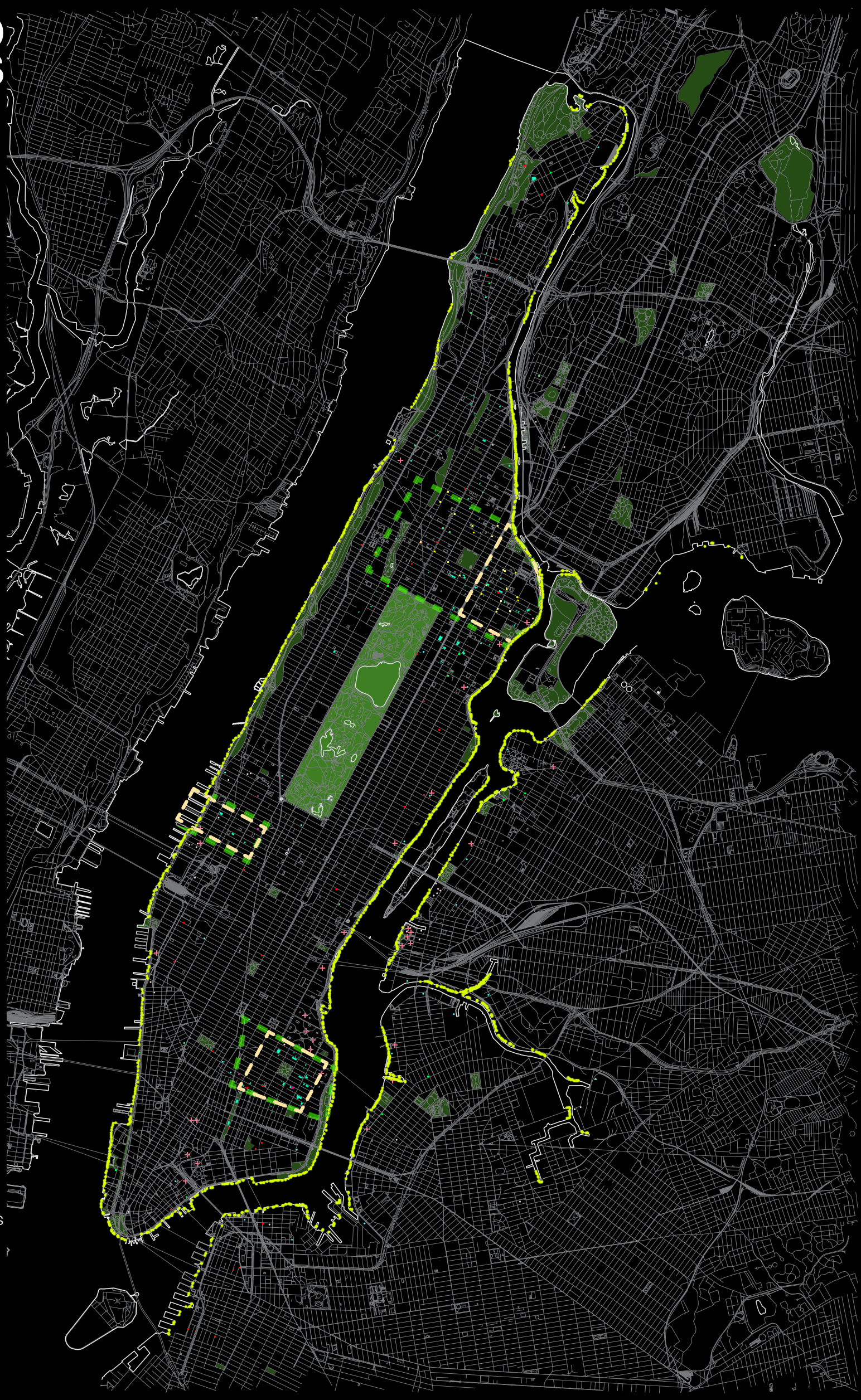
GREEN ZONES


green zones
parks and public spaces
community supported agricultural pickup sites
farmers markets
food coops
healthy bodegas
community gardens

TOXIC LAND


air pollution sites
brownfields
environmental cleanup sites sites
voluntary cleanup sites
combined seweage outfall

SELECTED ZONES



- selected zones
- air pollution sites
- brownfields
- environmental cleanup sites sites
- voluntary cleanup sites
- combined seweage outfall
- green zones
- parks and public spaces
- community supported agricultural pickup sites
- farmers markets
- food coops
- healthy bodegas
- community gardens

ZONE1: EAST HARLEM

ZONE 2: HELL'S KITCHEN

ZONE 3: ALPHABET CITY

After selecting potential sites for Sitopia, analysis of each zone will begin in order to zoom in further. Since community gardens can be regarded as the foundation of the food system that will expand through this project; understanding the reasons behind the occurrence of these gardens as well as the effect these gardens embody; socially and spatially, is significant.

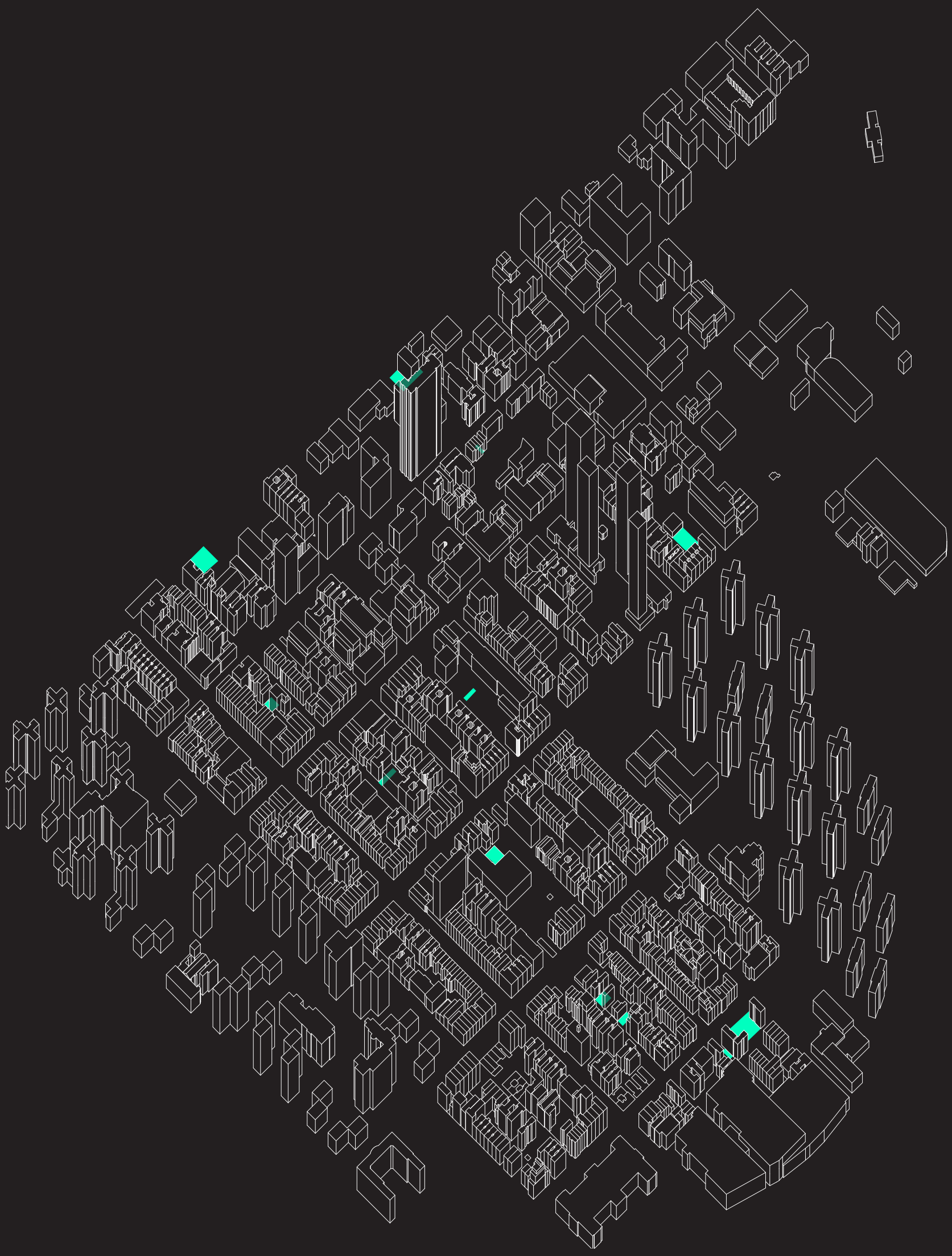
Community gardens had emerged in under developed areas where the residents could not afford buying healthy organic produce. Through repurposing empty lots and vacant structures these gardens were created. The gardens where residents cultivated their own produce, eventually became community hubs through overlaying of different programs such as performance spaces, sports fields, educational centers, etc. While some gardens have partnered with schools or hospitals, some are solely serving the residents around. The edibles in the gardens vary not only according to the type but also according to their quantity.

Sitopia seeks to satisfy not only the residents within the zones, expanding the notion of a community garden, but also residents outside of these districts; still working hand in hand with rural traditional farmland. Through implementation of Sitopia districts; the import of specialized fruits and vegetables will be significantly lowered. In other words, Sitopia's intention is not to produce specialized organic fruits and vegetables to satisfy the city as a whole but to work with farms outside of the city centers collectively.

In order to gauge the production; occupancy loads and volume of required arable land on each block were calculated. The occupancies act as a primary factor which determines the spatial requirements for garden spaces. The goal is to cultivate double the amount of produce necessary to satisfy the needs of the zone in order to serve the city at large.

The project focuses on interrelationship between the residential buildings and garden spaces; therefore, landuse map is used as one of the factors to select the group of blocks this project will be focusing on. Furthermore, since one of the main drivers for community gardens to emerge was the financial constraints of the residents within the neighborhoods, financial analysis is used in order to better understand socio-economic factors that will effect the project. Similarly, analyzing the existing built environment, types of housing, building dates and ratio of vacant lots, aids in respect to understanding the spatial opportunities that can be exploited as well as the constraints that needs to be overcame. Finally, since exposure to sun is the primary requirement in agriculture, sun analysis is utilized to measure the rate of exposure in each zone which eventually effect the distribution of garden spaces. After the analysis of each zone, six block area in Alphabet City is selected as the focused site for the project.

ZONE 1: EAST HARLEM



carver community garden

jackie robinson community garden

bitter melon
blueberry
cantaloupe
grape
strawberry
watermelon
chard
collard
sweet pepper
kale
lettuce
basil
chamomile
chive
cilantro
comfrey
dill
fennel
lavender
lemongrass
marjoram
mint
oregano
parsley
sage
thyme
apple
apricot
peach
asparagus
beans
beet
broccoli
winter squash
brussel sprouts
cabbage
carrot
cauliflower
corn
cucumber
eggplant
garlic
onion
peas
potato
pumpkin
radish
scallion
summer
squash
tomato

magic garden

strawberry
mintjalapeno
eggplant
arugula
apricot
sweet peppers
basil
cabbage
tomato
cilantro

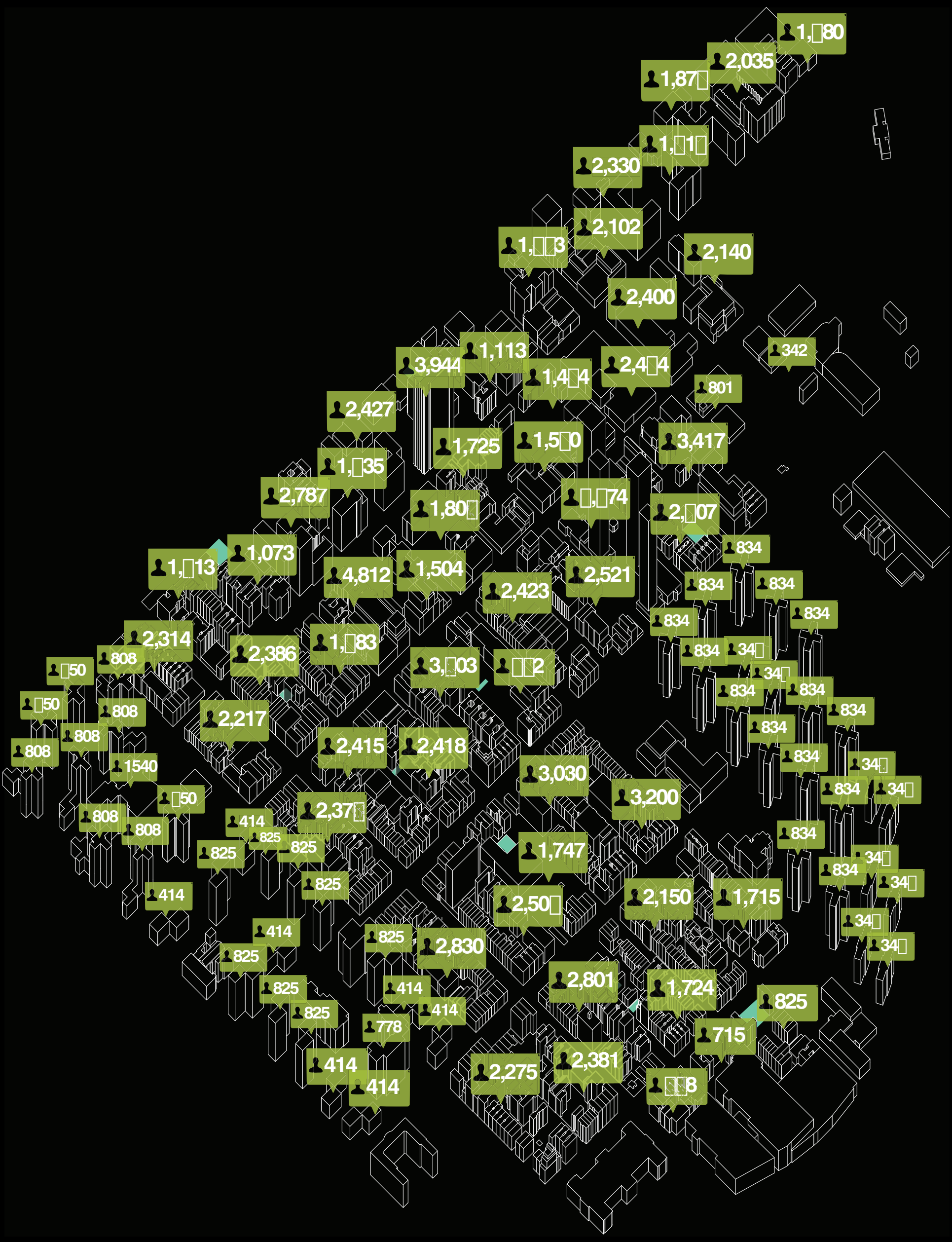
papo's garden

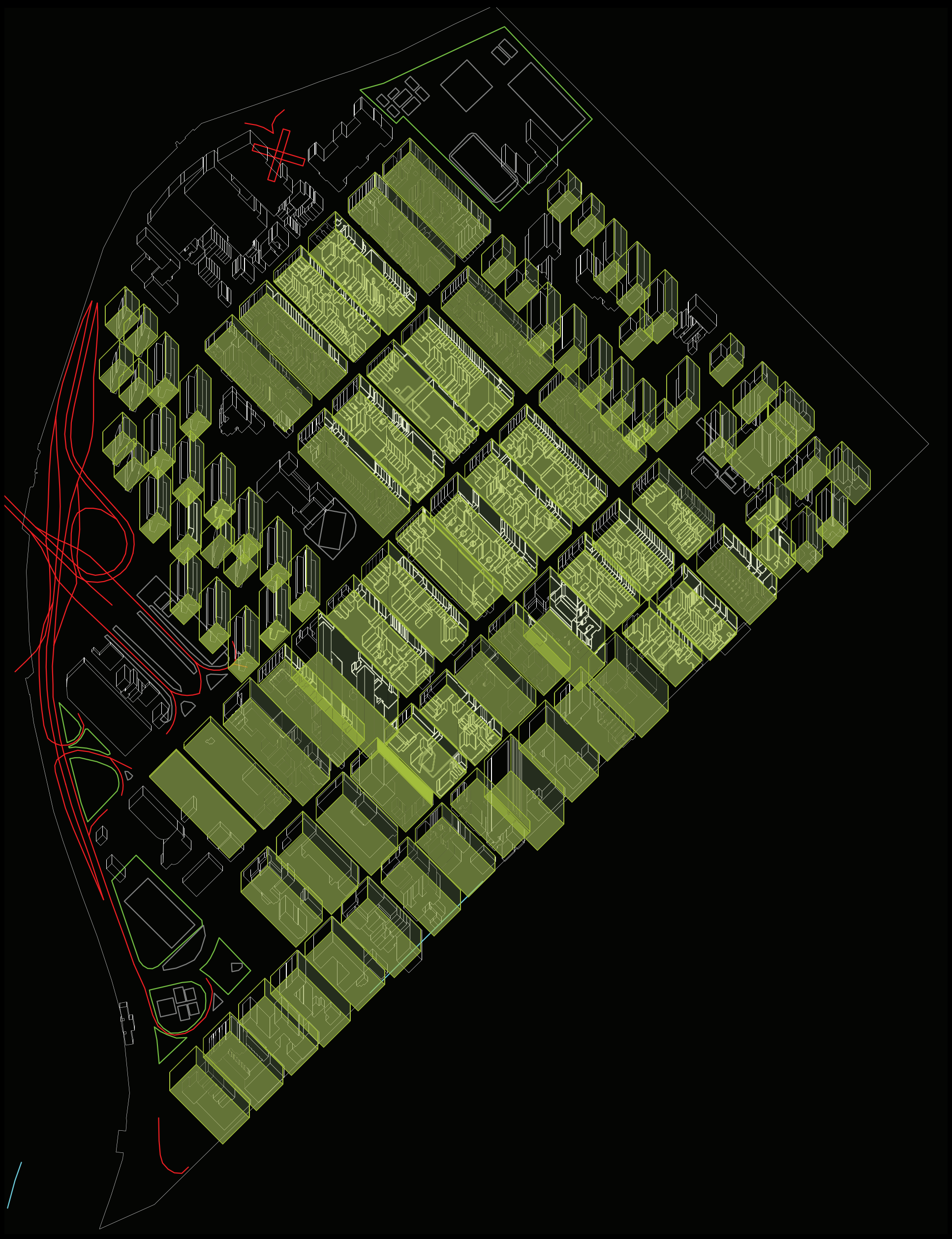
rodale pleasant park community garden

arugula
lettuce
dill
pear
garlic
summer
squash
bok choy
spinach
mint
beans
habanero
sweet peppers
chard
basil
parsley
broccoli
jalapeno
tomato
collard
chive
apple
cabbage
peas
kale
cilantro
peach
carrot
raddish

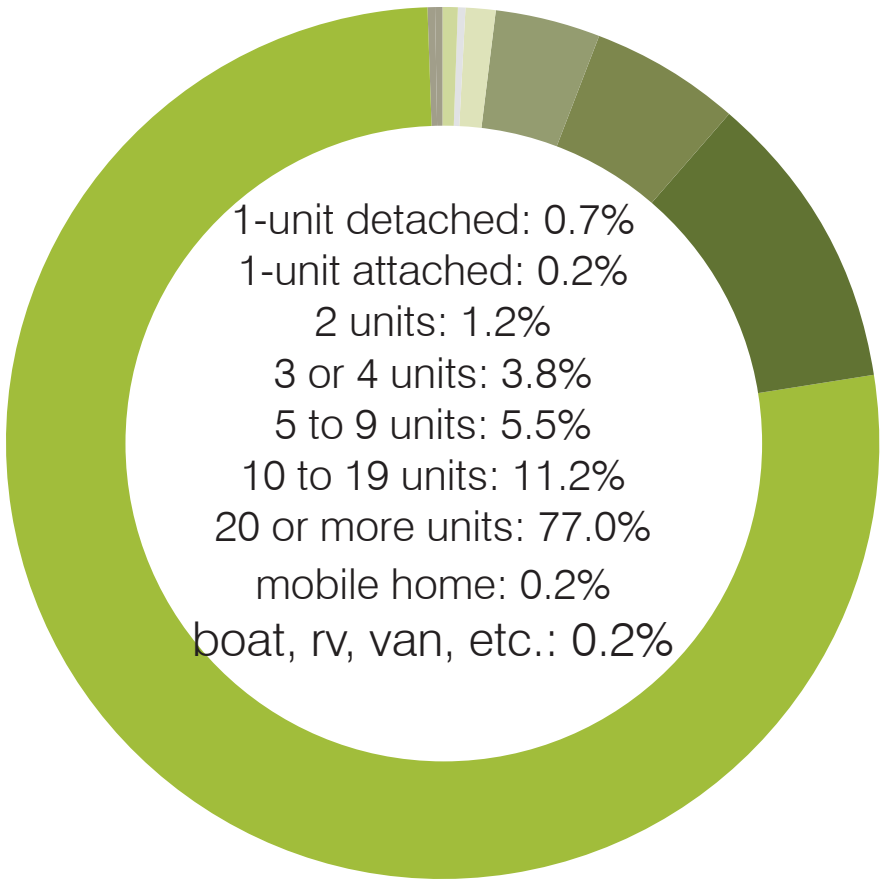
life spire CRMD, inc
el gallo social club inc
la casita
corozal
diamante
target east harlem community garden
los amigos

OCCUPANCY ANALYSIS

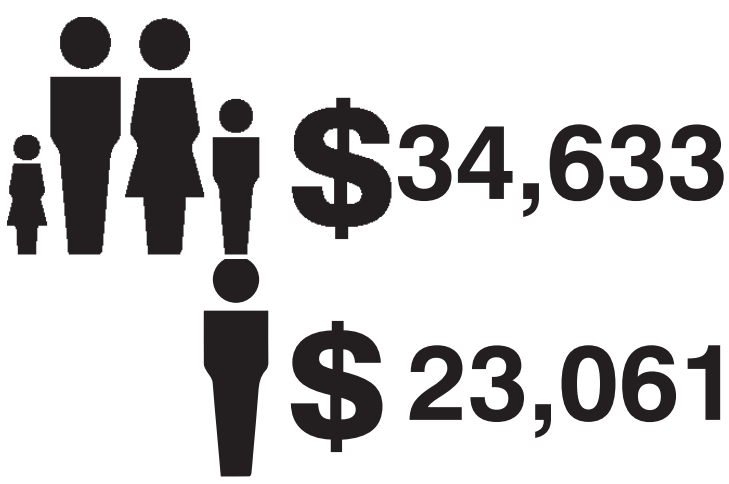


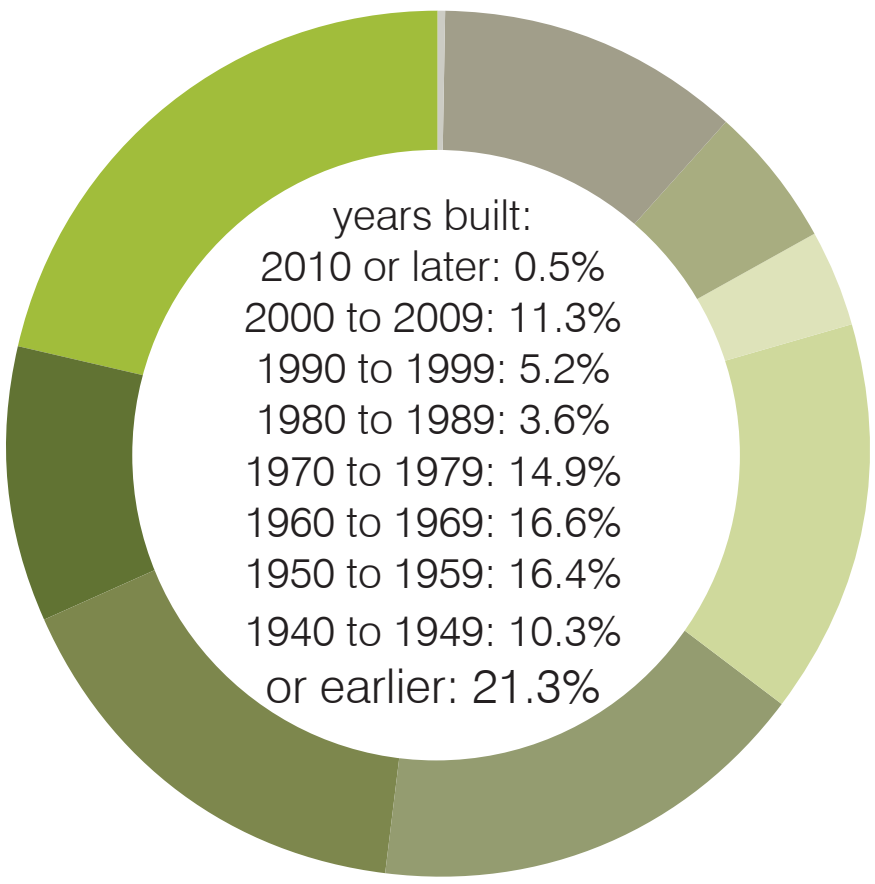


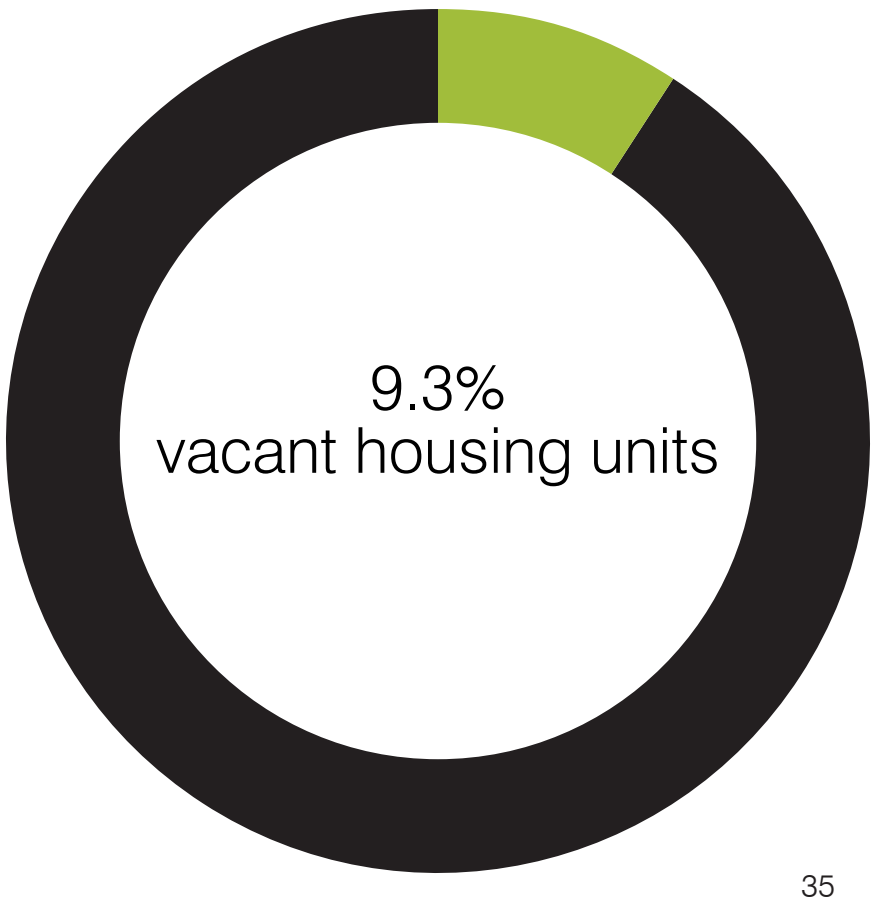
LAND USE/ DEMOGRAPHICS



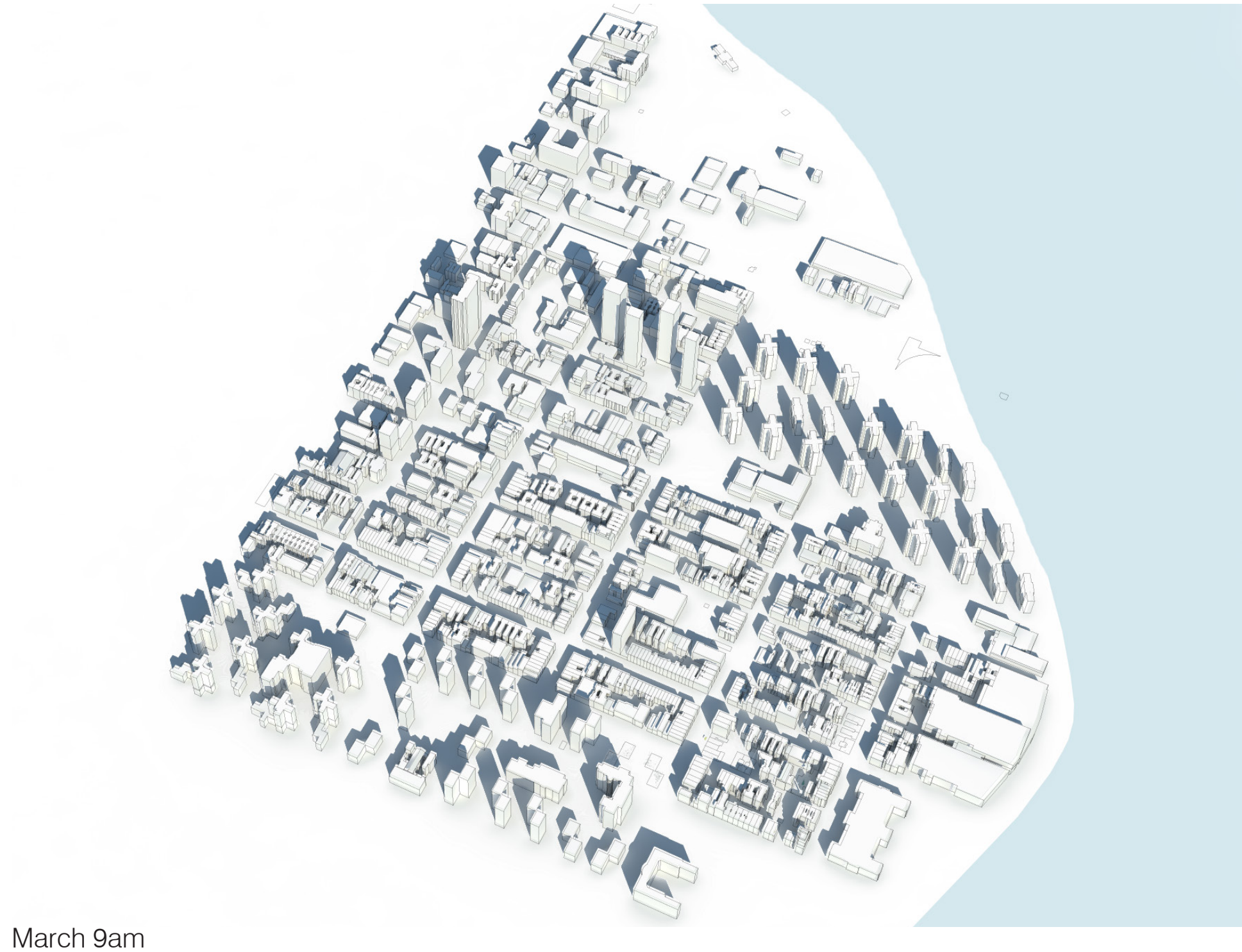
Less than $10,000: %12.8
$10,000 to $14,999: %8.3
$15,000 to $24,999: %14.9
$25,000 to $34,999: %14.4
$35,000 to $49,999: %13.2
$50,000 to $74,999: %14.1
$75,000 to $99,999: %7.2
$100,000 to $149,999: %8.3
$150,000 to $199,999: %3.0
$200,000 or more: %3.8







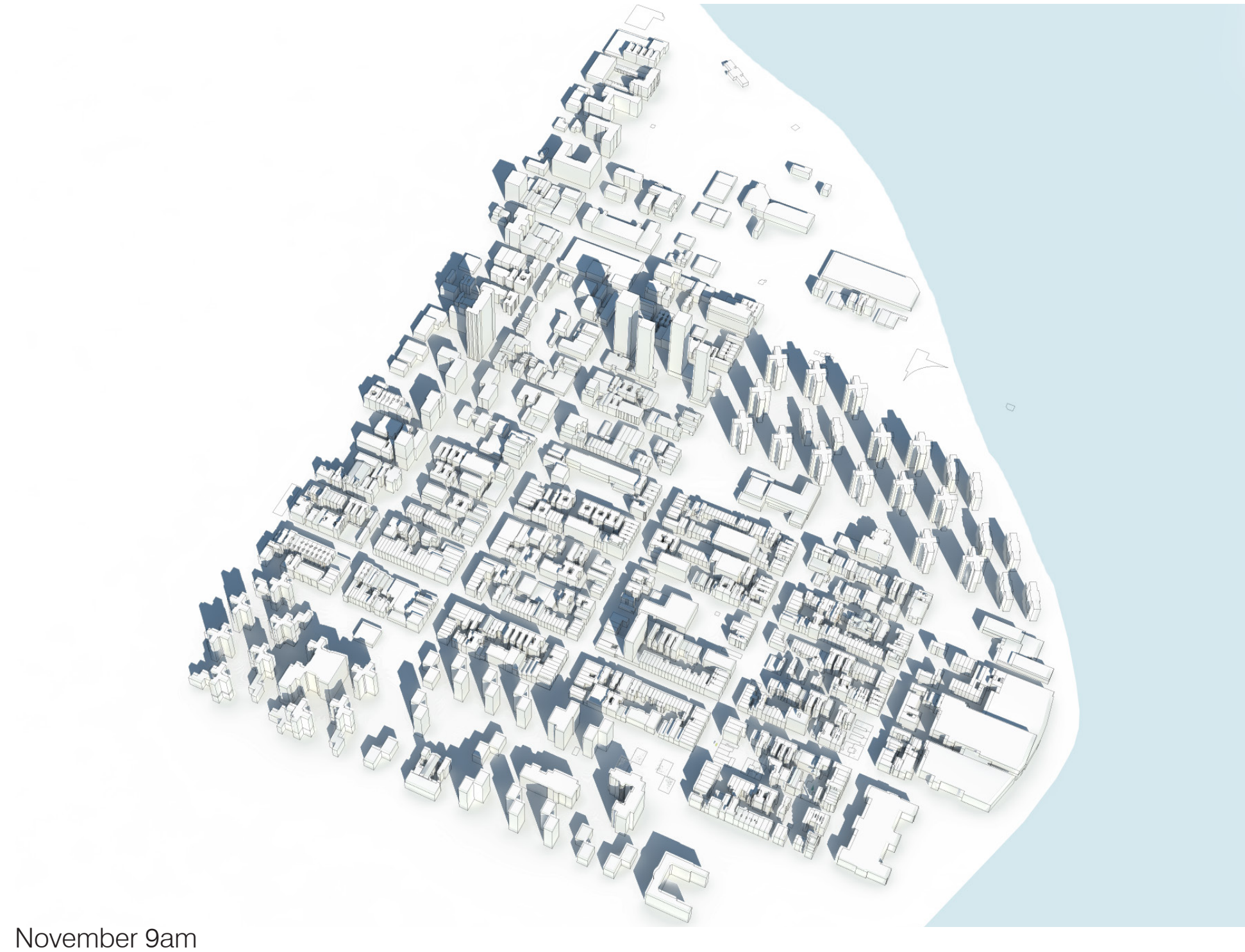
SUN ANALYSIS



March 9am

March 1pm

March 5pm

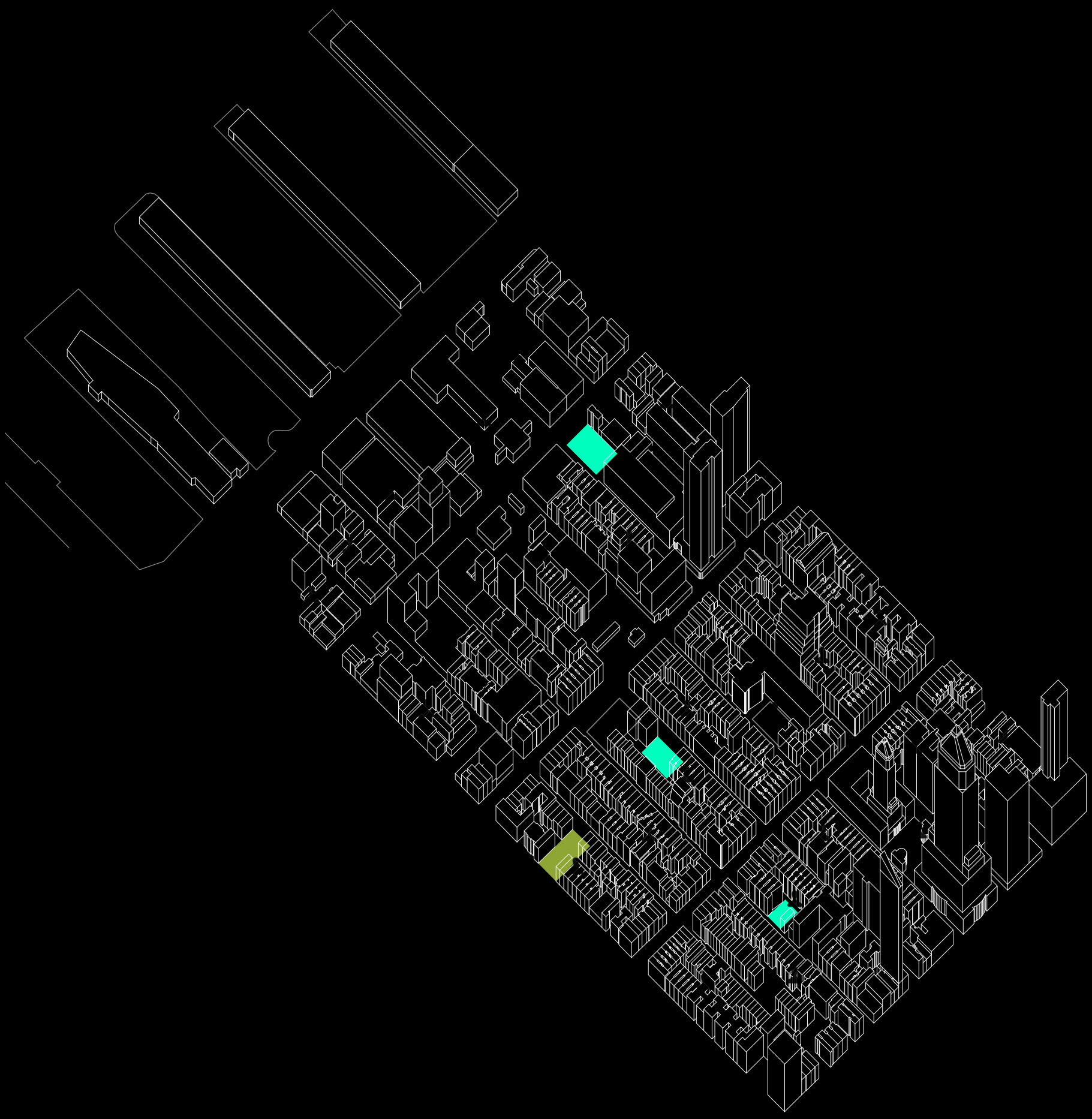


November 9am

November 1pm

November 5pm

ZONE 2: HELL'S KITCHEN



clinton community garden

blueberry
cantaloupe
grapes
raspberry
rhubarb
strawberry
carrots
cauliflower
corn
tomato

arugula
bok choy
chard
lettuce
spinach
basil
cucumber
garlic
habanero
turnip

cilantro
comfrey
dill
echinacea
epazore
lavender
jalapeno
onion
parsnip

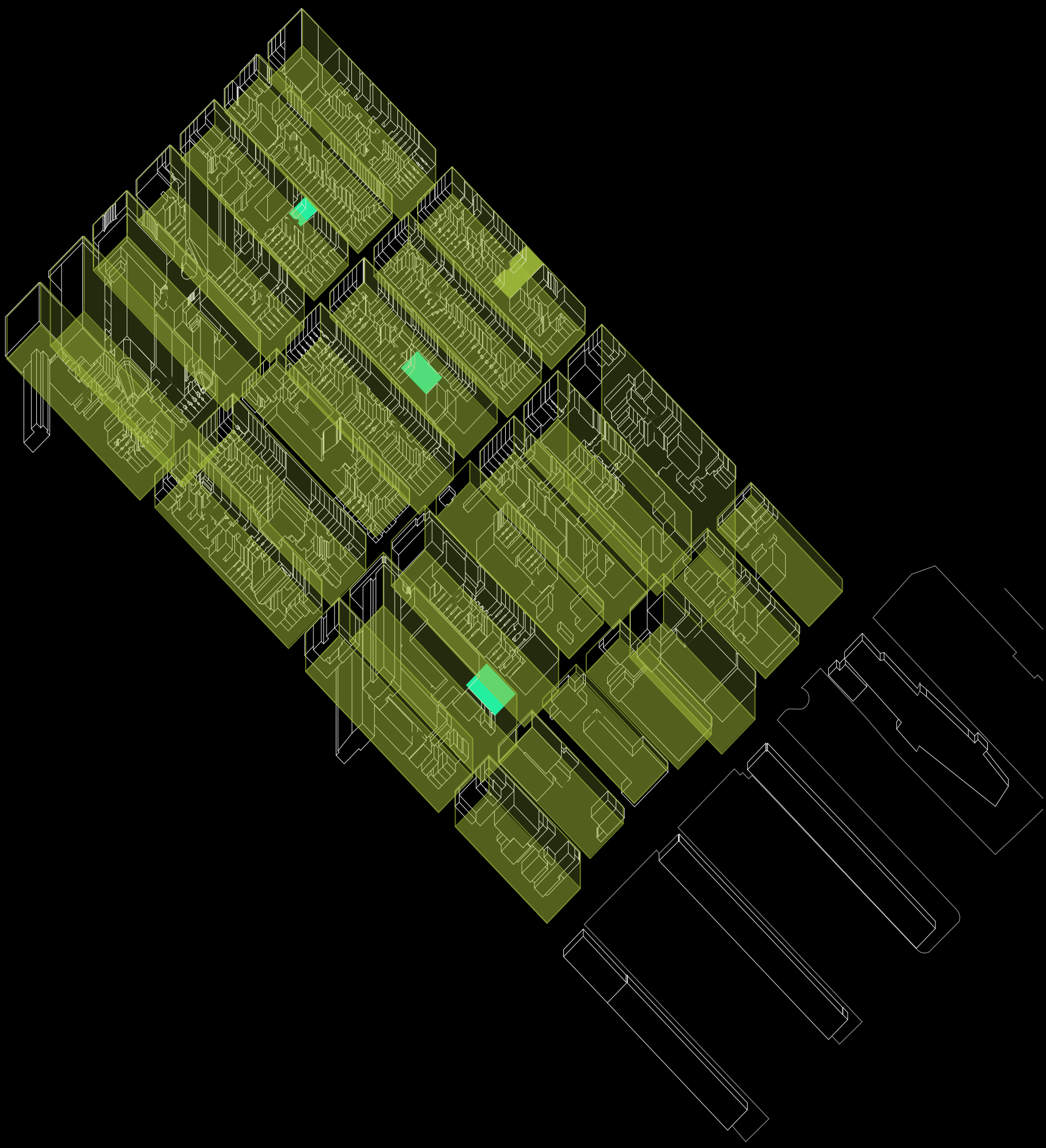
marjoran
mint
oregano
parsley
sage
thyme
peas
pumpkin
radish

apple
asparagus
beans
broccoli
brussel sprouts
cabbage
summer squash
sweet peppers
winter squash

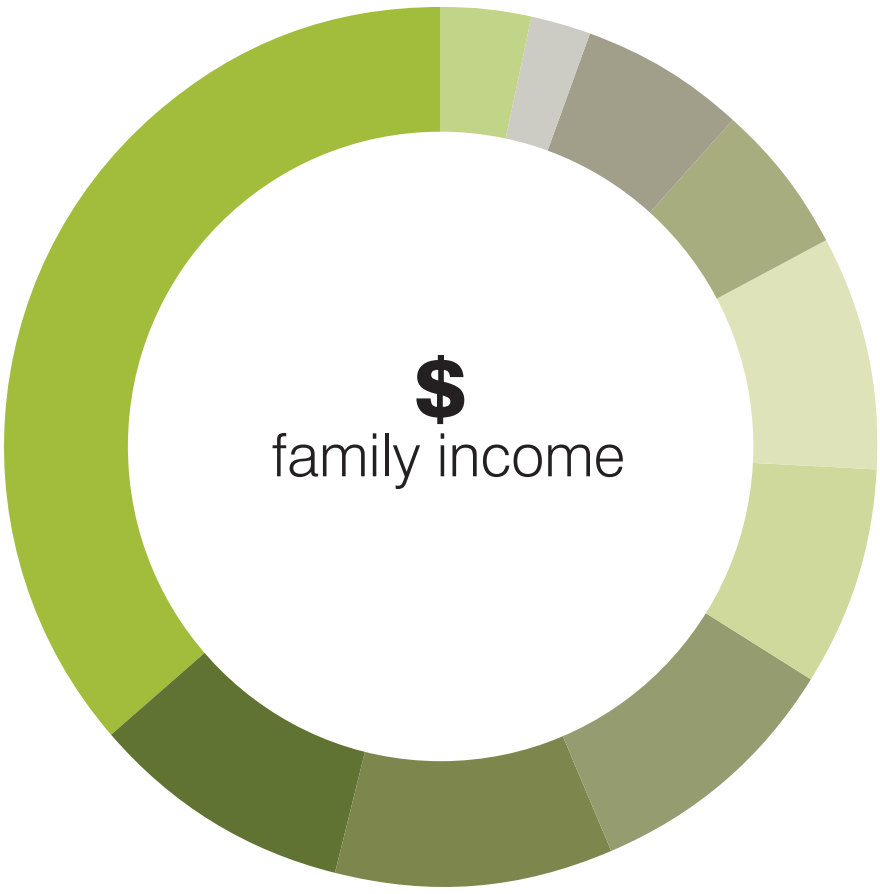
marian. s. heiskell garden

juan alanzo community garden

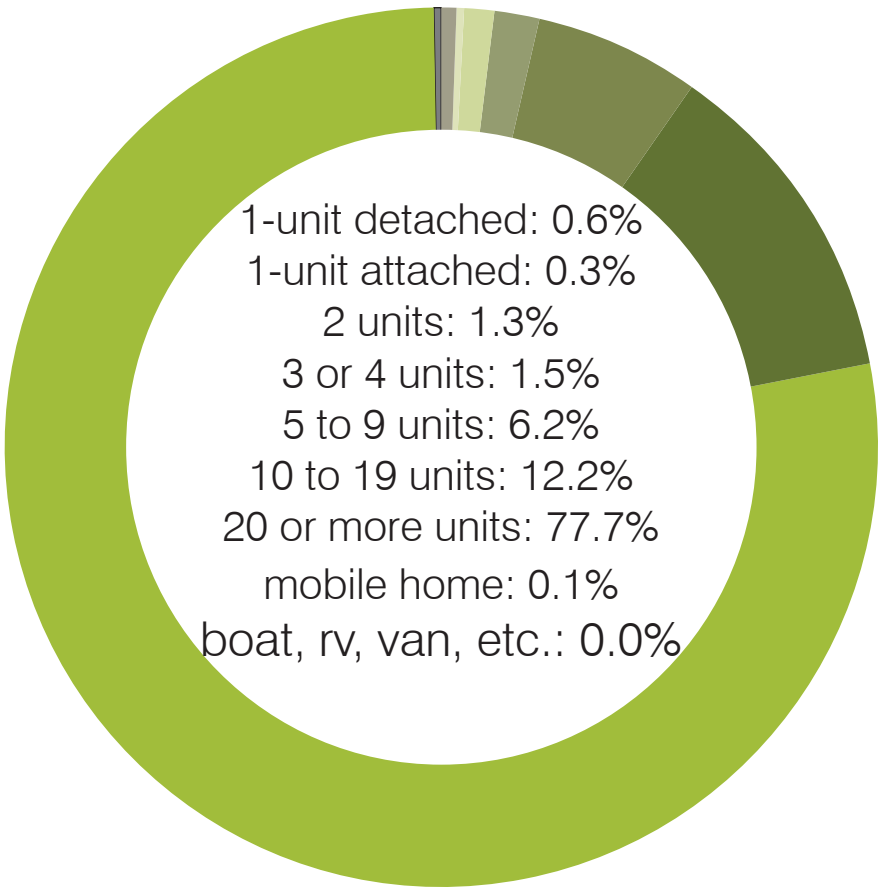
OCCUPANCY ANALYSIS

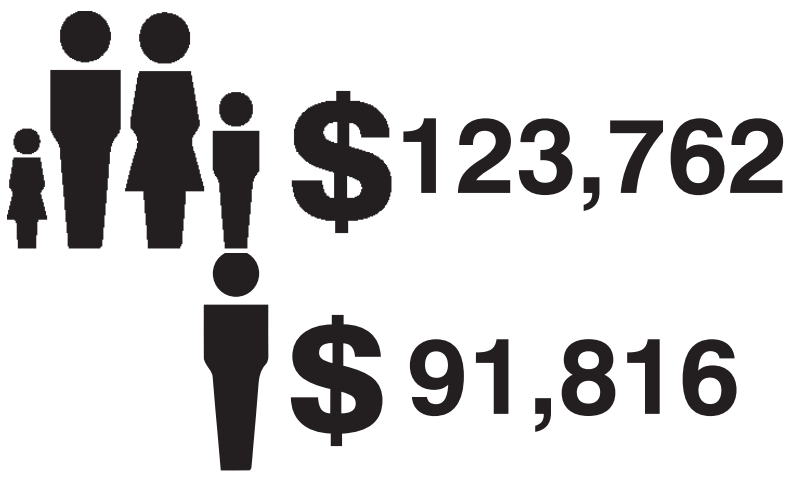


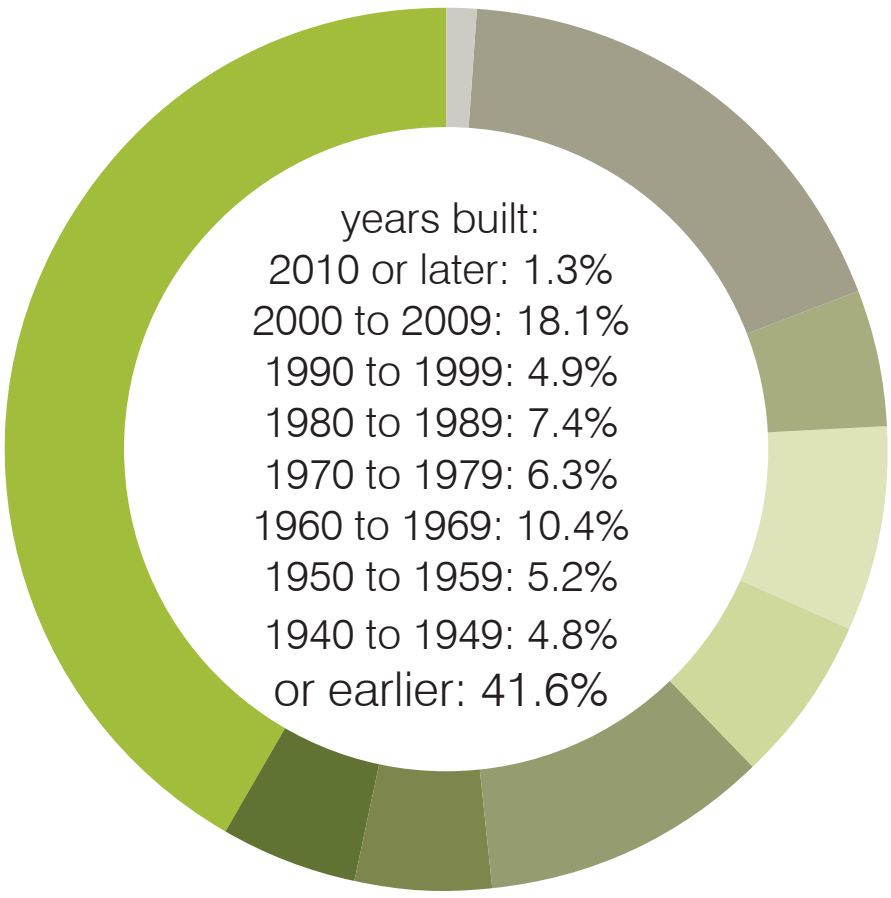
LAND USE/ DEMOGRAPHICS

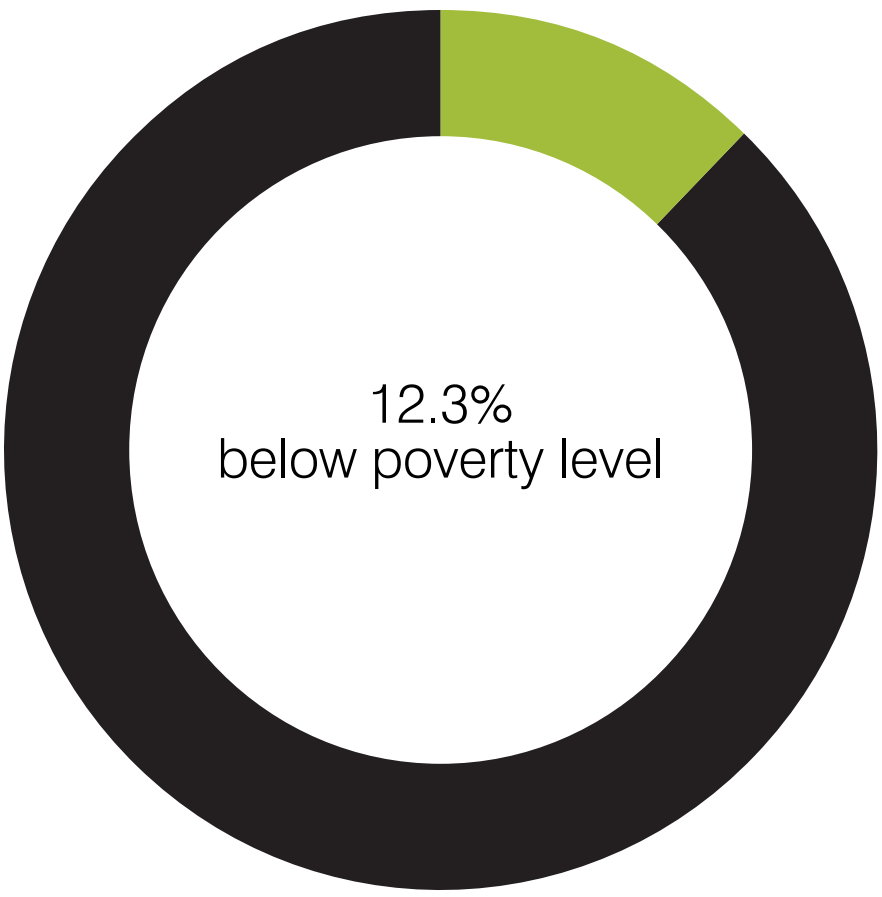


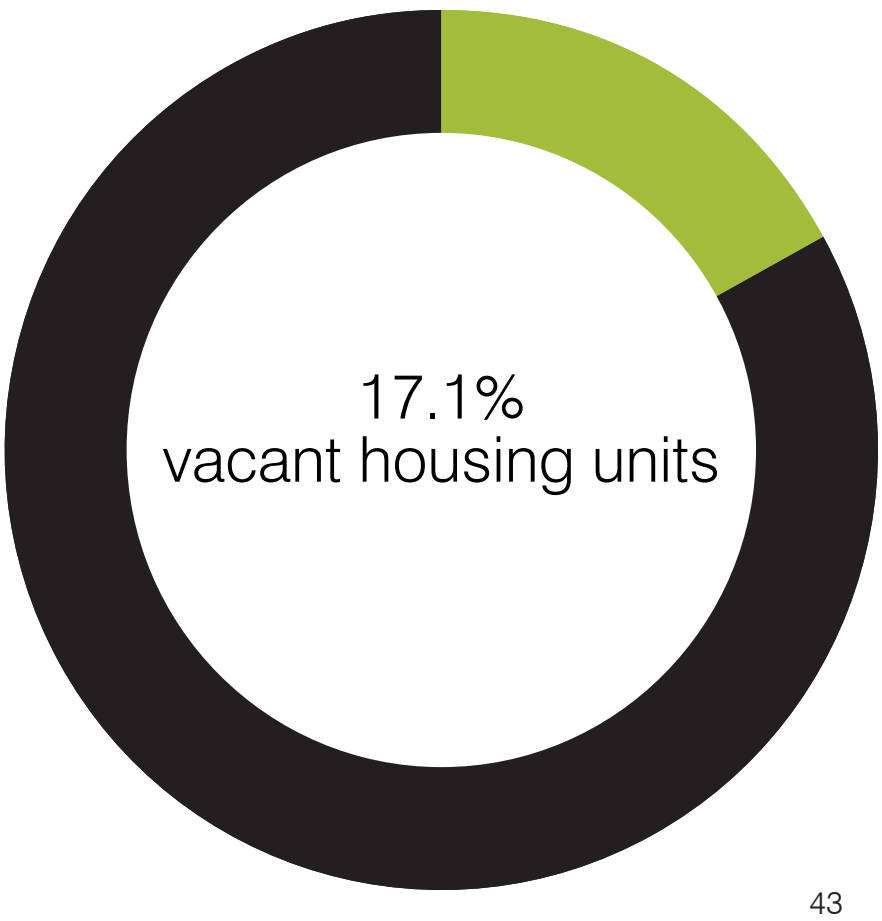
Less than $10,000: 3.6%
$10,000 to $14,999: 2.0%
$15,000 to $24,999: 6.2%
$25,000 to $34,999: 5.7%
$35,000 to $49,999: 8.6%
$50,000 to $74,999: 8.0%
$75,000 to $99,999: 9.6%
$100,000 to $149,999: 10.4%
$150,000 to $199,999: 9.6%
$200,000 or more: 36.4%



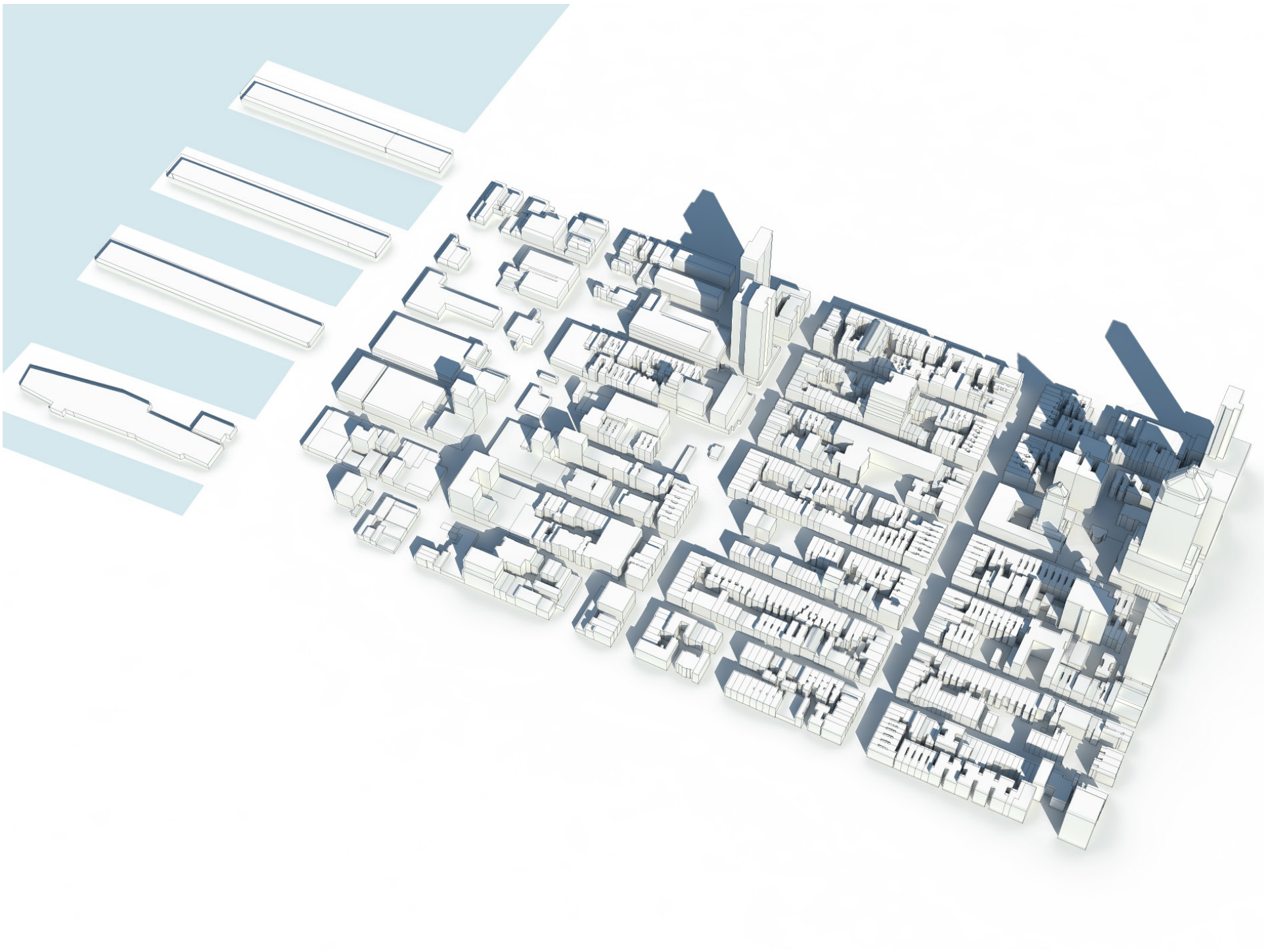




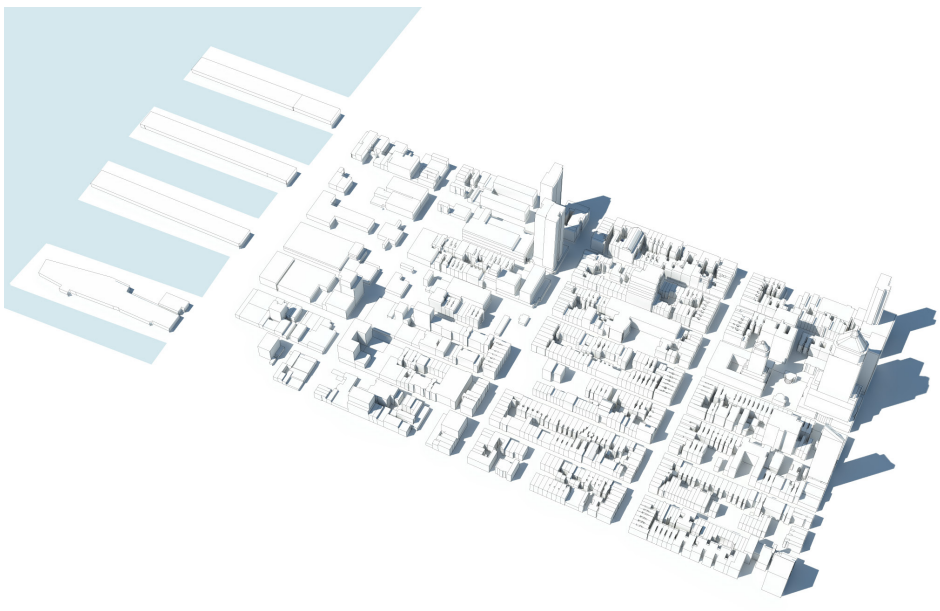




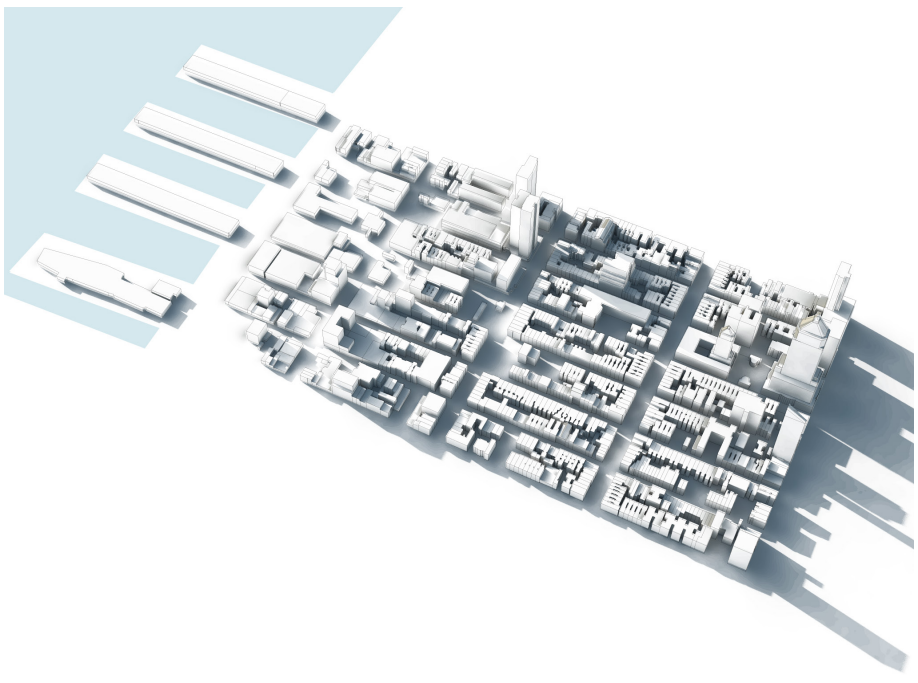
SUN ANALYSIS



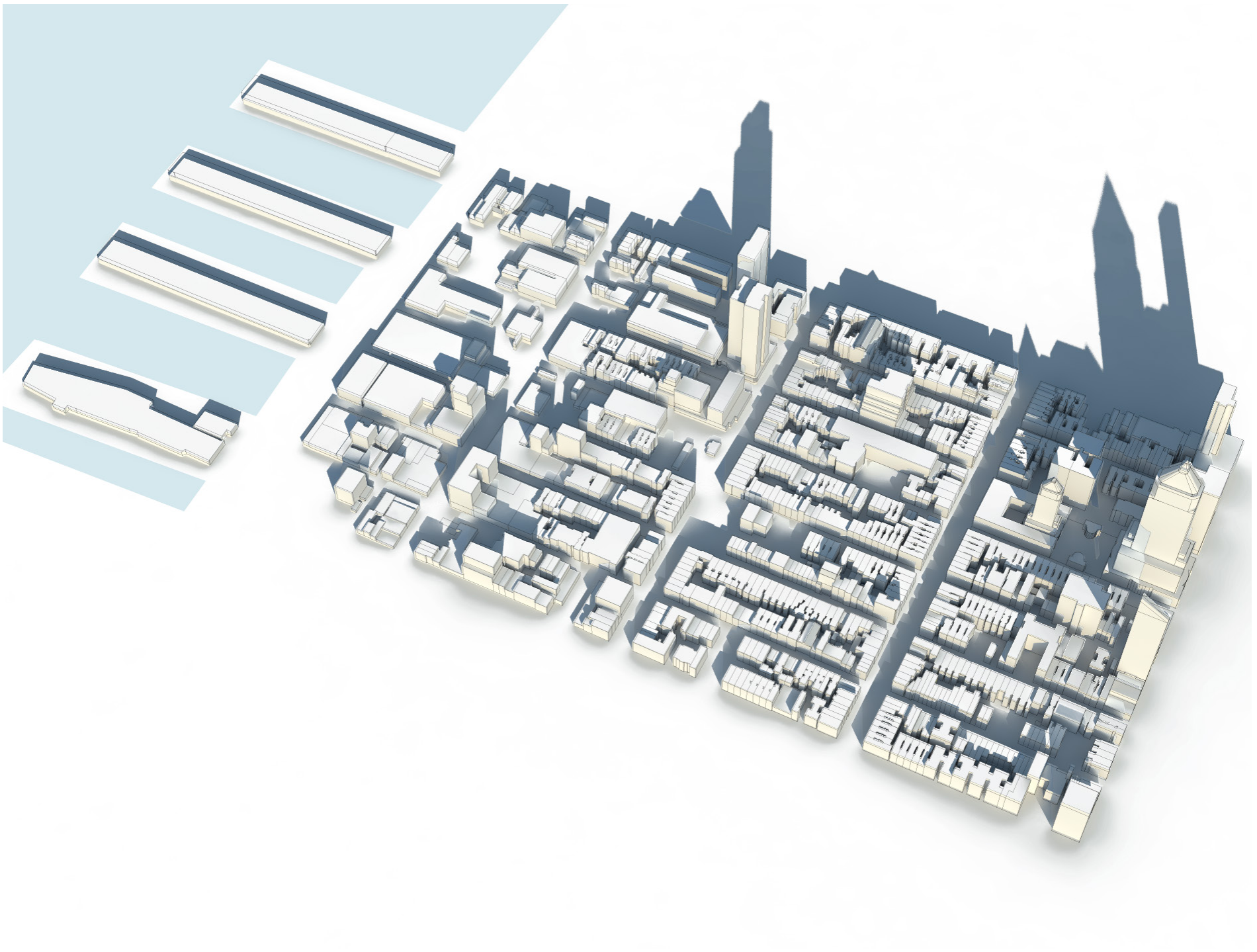
March 9am



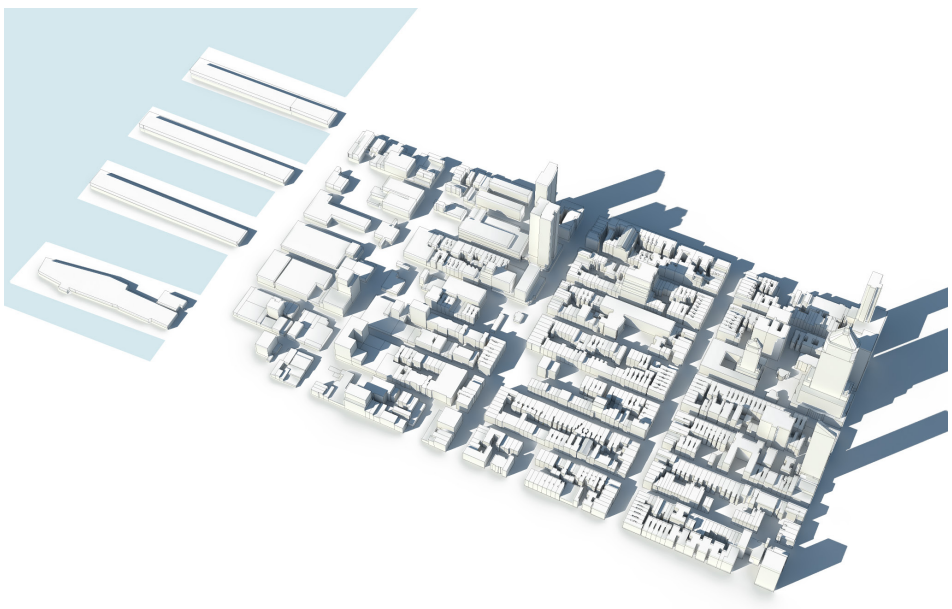
March 1pm



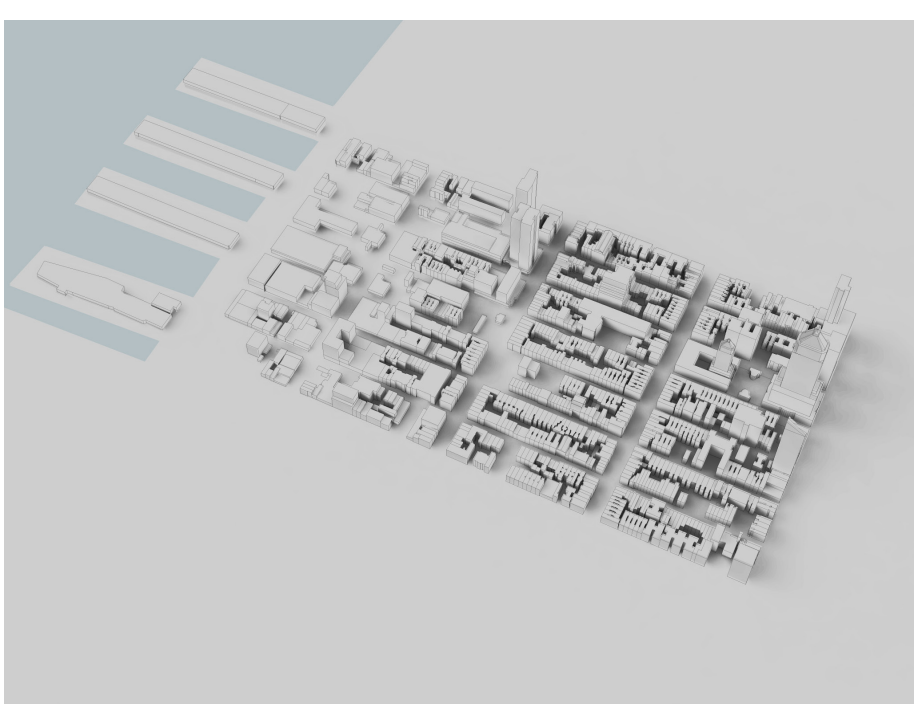
March 5pm



November 9am

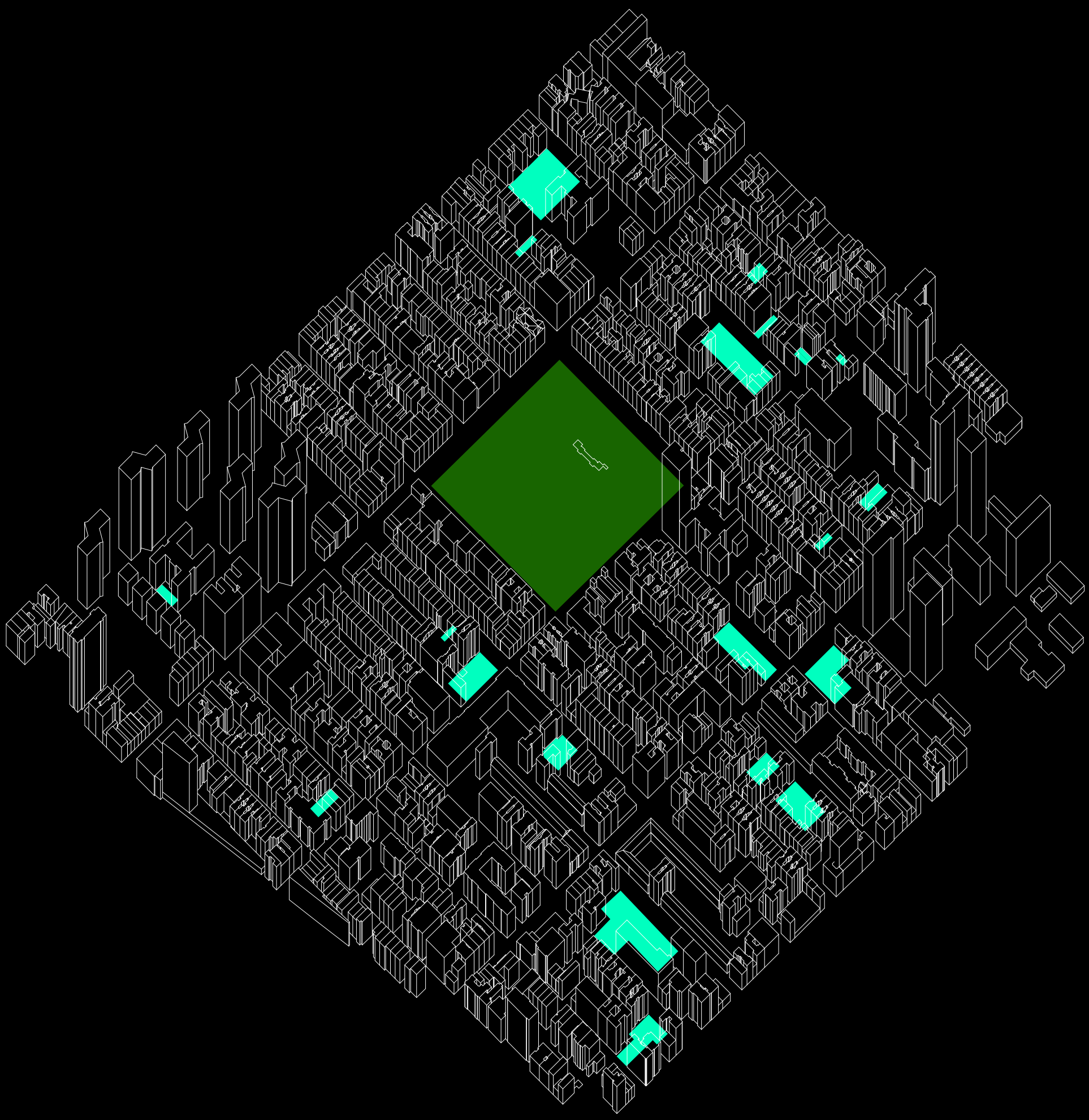


November 1pm



November 5pm

ZONE 3: ALPHABET CITY



all people's garden, inc

raspberry
mint
apple
peach
tomato

el jardin del paraiso

blackberry
blueberry
cantaloupe
grape
raspberry
strawberry
jalapeno
pumpkin
tomato
amaranth
arugula
chard
collard
kale
lettuce
raddish
scallion
mesclun
spinach
basil
chive
cilantro
dill
summer squash
sweet peppers
echinacea
fennel
lettuce
lavender
mint
oregano
parsley
sage
thyme
apricot
cherrypeach
beans
broccoli
brussel sprouts
corn
cucumber

le petit versailles

basil
lavender
mulberry
tomato

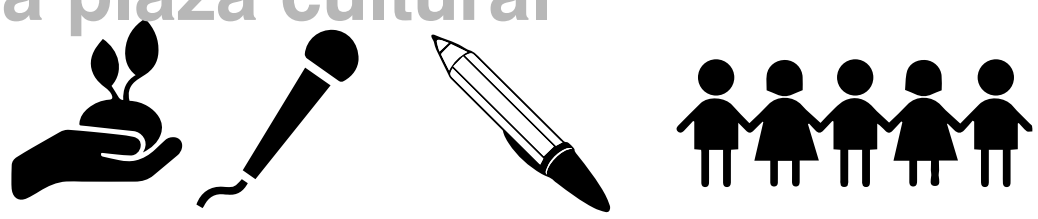
the third street children's garden

strawberry
collard
lettuce
basil
chamomile
cilantro
echinacea
lavender
lemongrass
mint
parsley
cucumber
sweet peppers
tomato

creative little garden

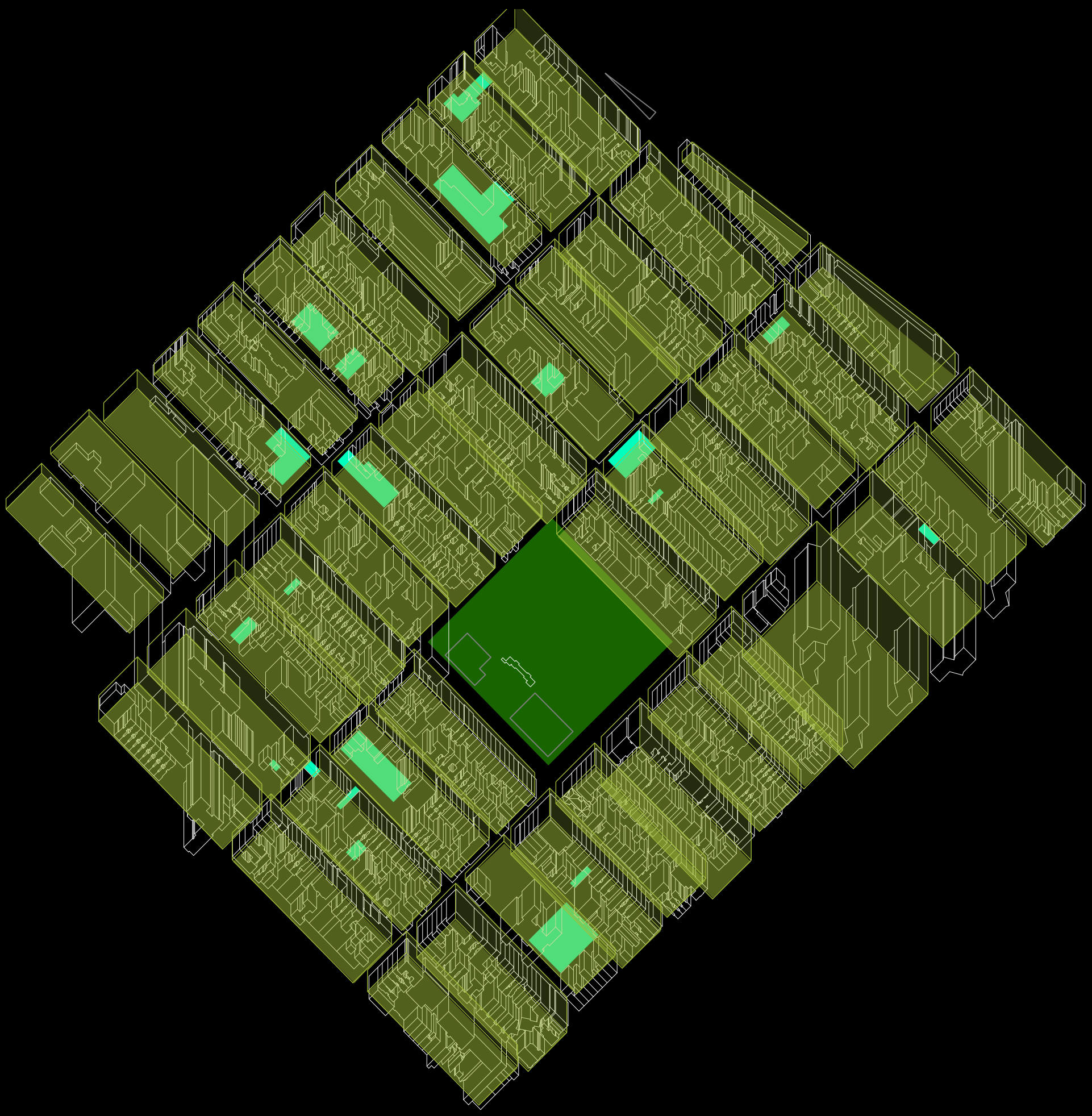
echinacea
mint

la plaza cultural



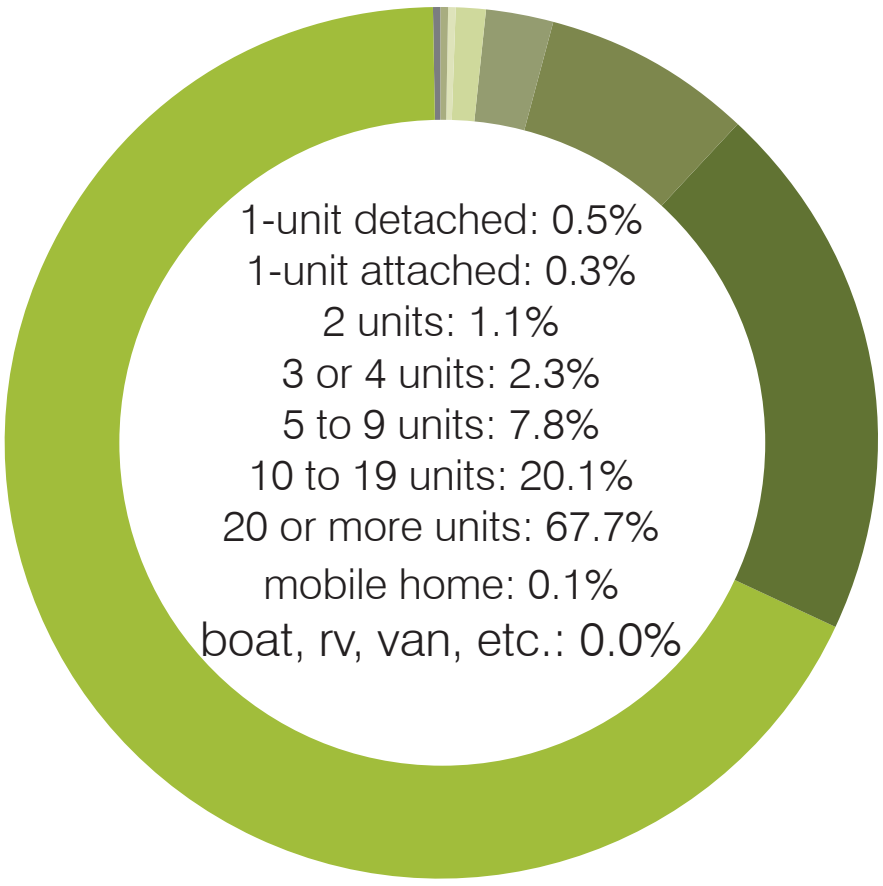
blackberry
bittermelon
blueberry
elderberry
grape
kiwi
honeydew
raspberry
rhubarb
watermel
amaranth
arugula
chard
collard
endive
kale
lettuce
mache
splinach
basil
chamomile
chive
cilantro
comfrey
dill
echinacea
fennel
lavender
lemongrass
mint
oregano
parsley
sage
thyme
apple
cherry
pear
plum
asparagus
beans
cabbage
corn
cucumber
eggplant
garlic
jalapeno
parsnip
peas
potato
pumpkin
scallion
summer
sweet pe
tomato

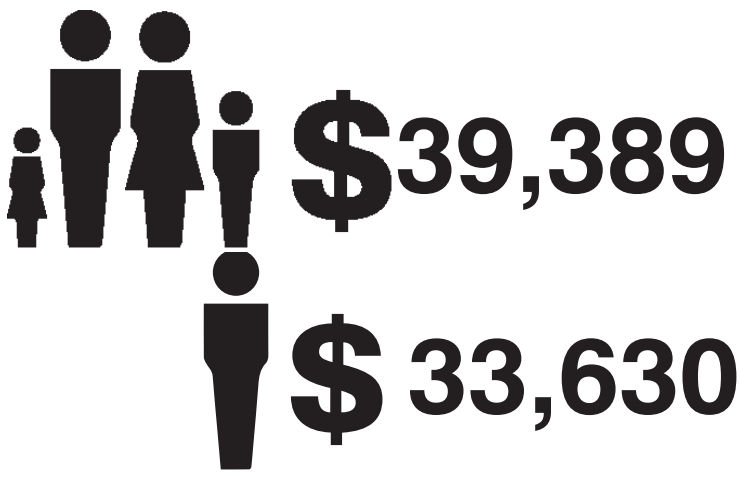
OCCUPANCY ANALYSIS

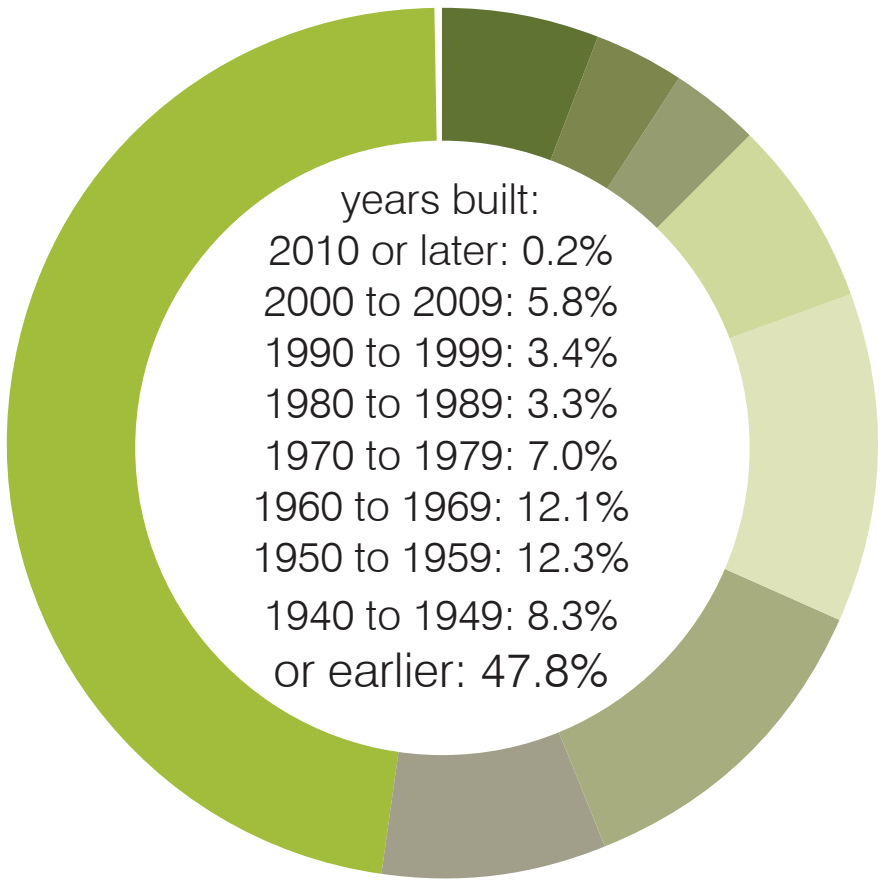


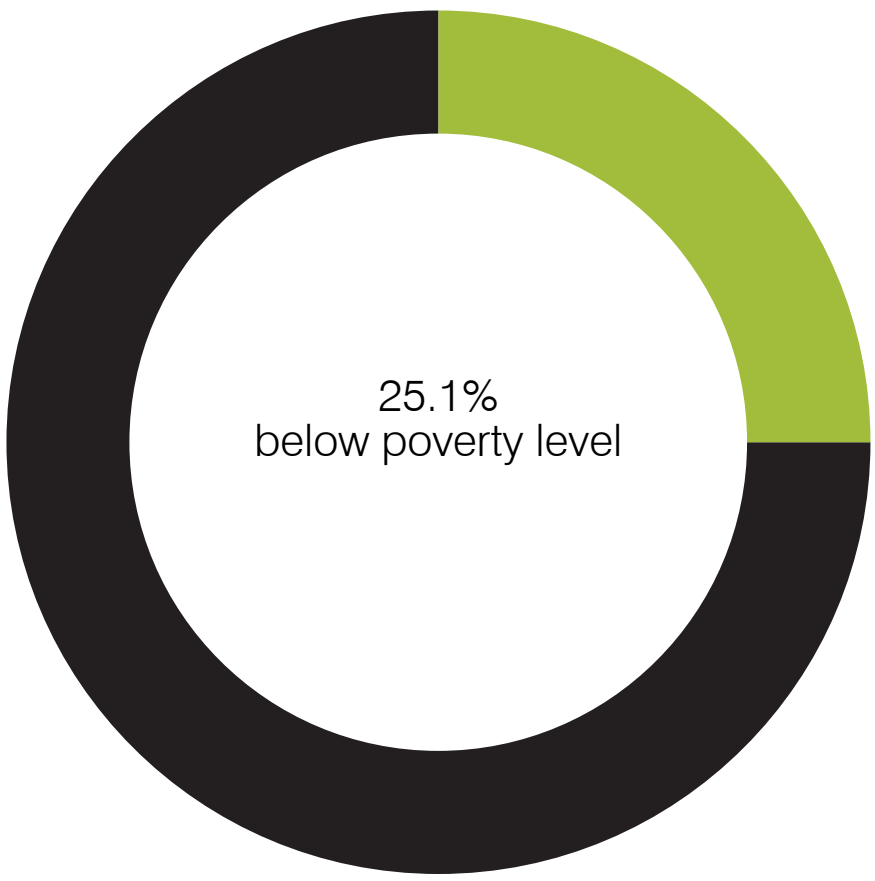
LAND USE/ DEMOGRAPHICS

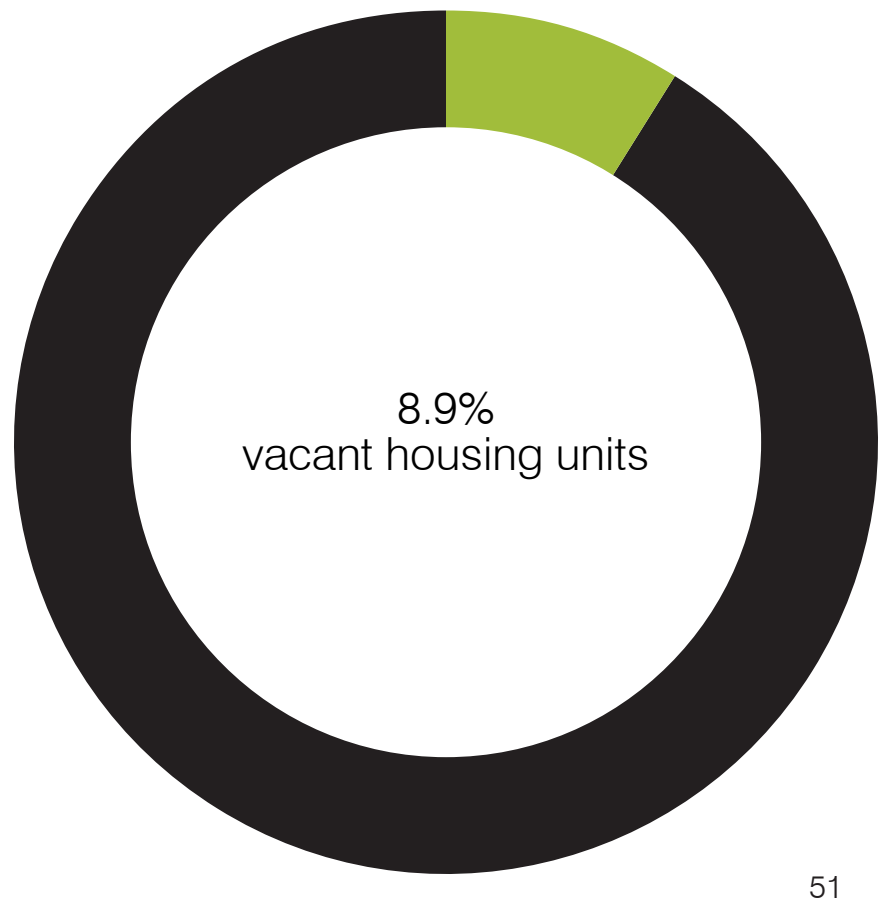
Less than $10,000: 9.1%
$10,000 to $14,999: 10.1%
$15,000 to $24,999: 14.8%
$25,000 to $34,999: 12.0%
$35,000 to $49,999: 11.0%
$50,000 to $74,999: 14.3%
$75,000 to $99,999: 8.3%
$100,000 to $149,999: 8.7%
$150,000 to $199,999: 4.7%
$200,000 or more: 6.9%

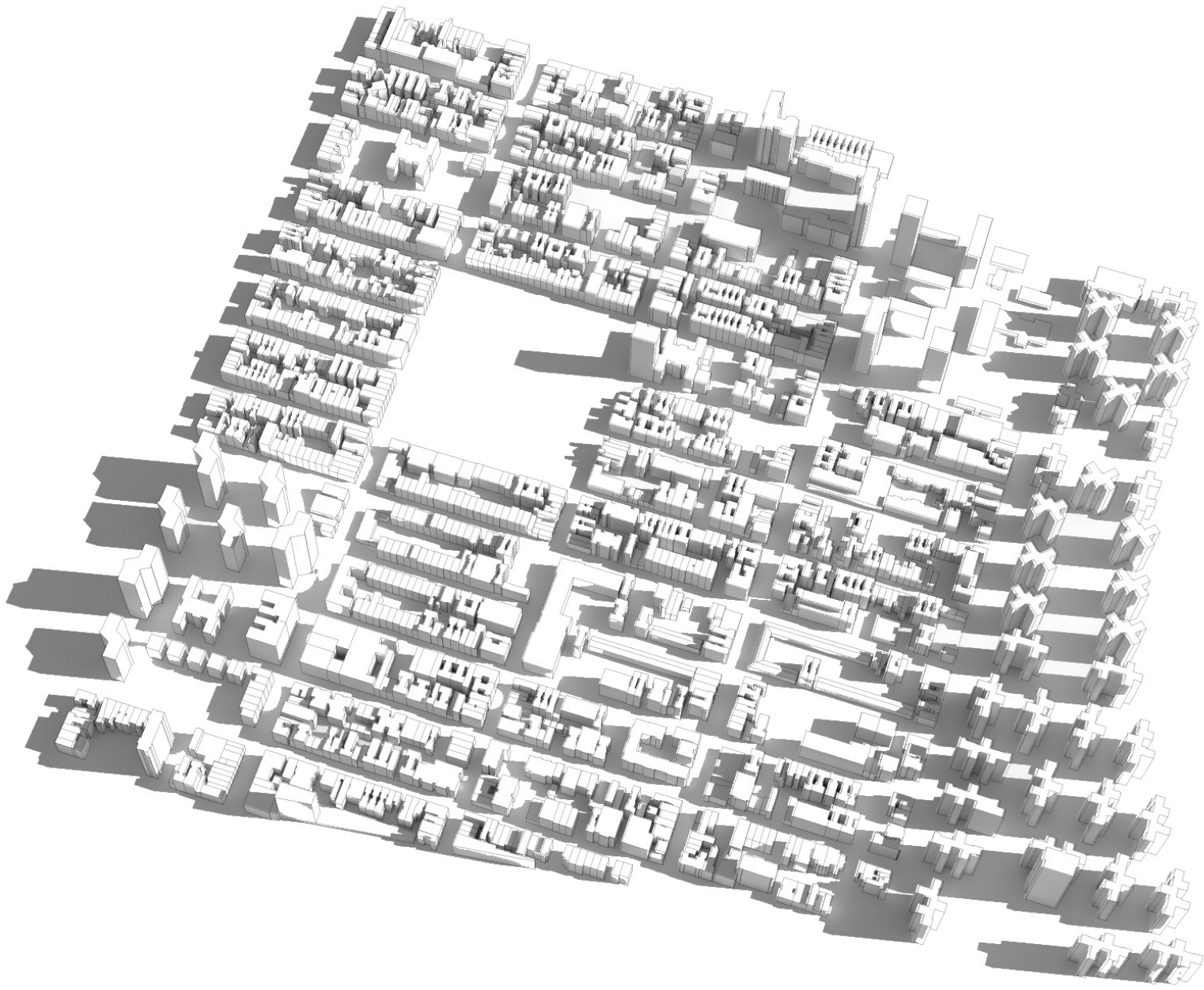




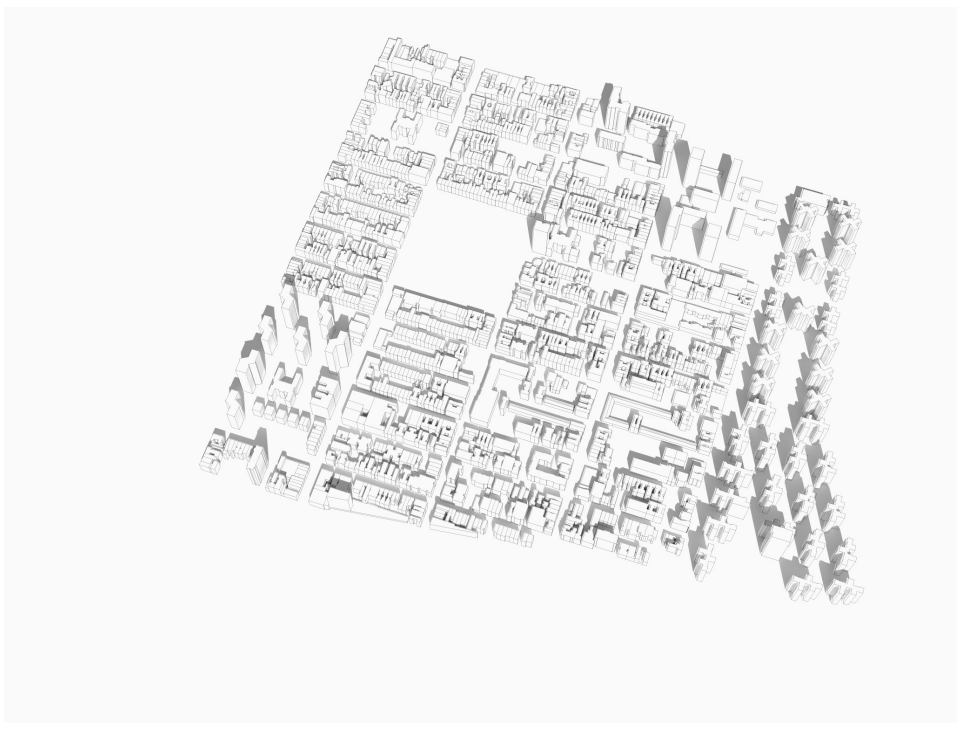




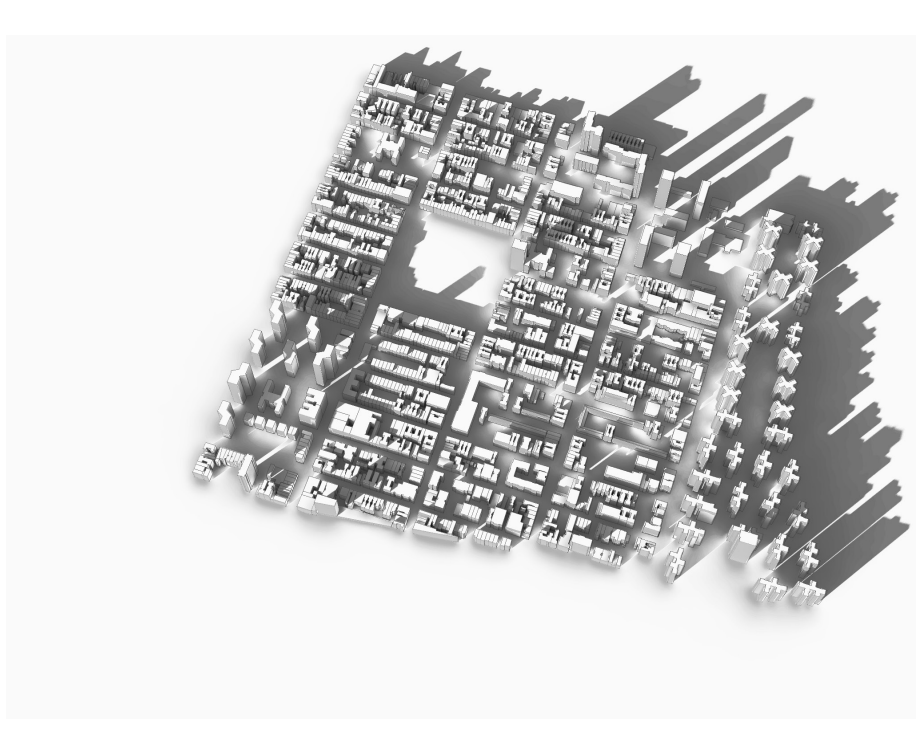




March 9am

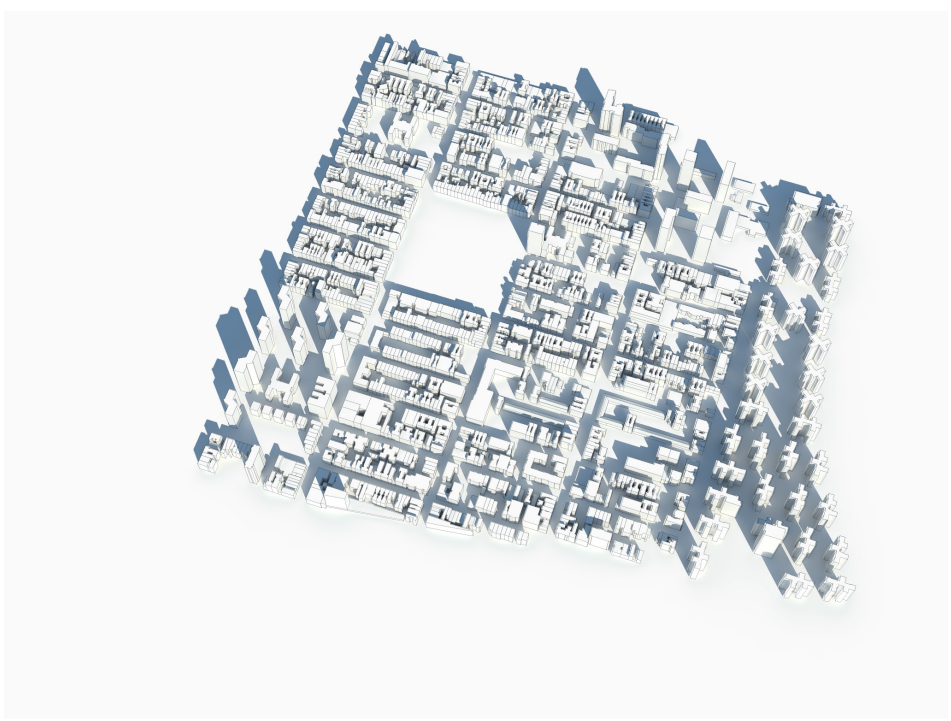


March 1pm

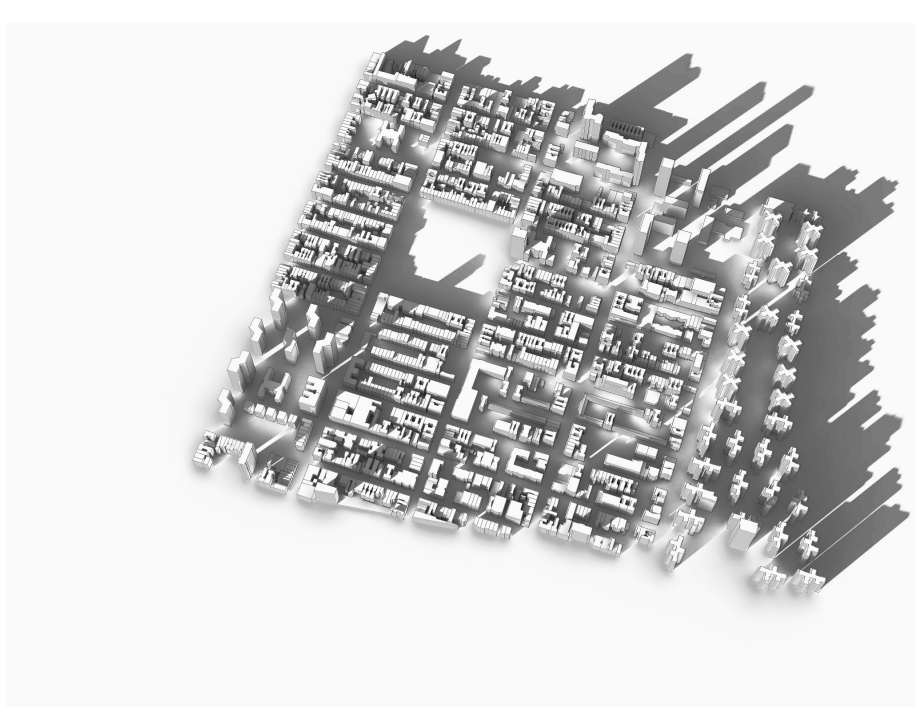


March 5pm

November 9am

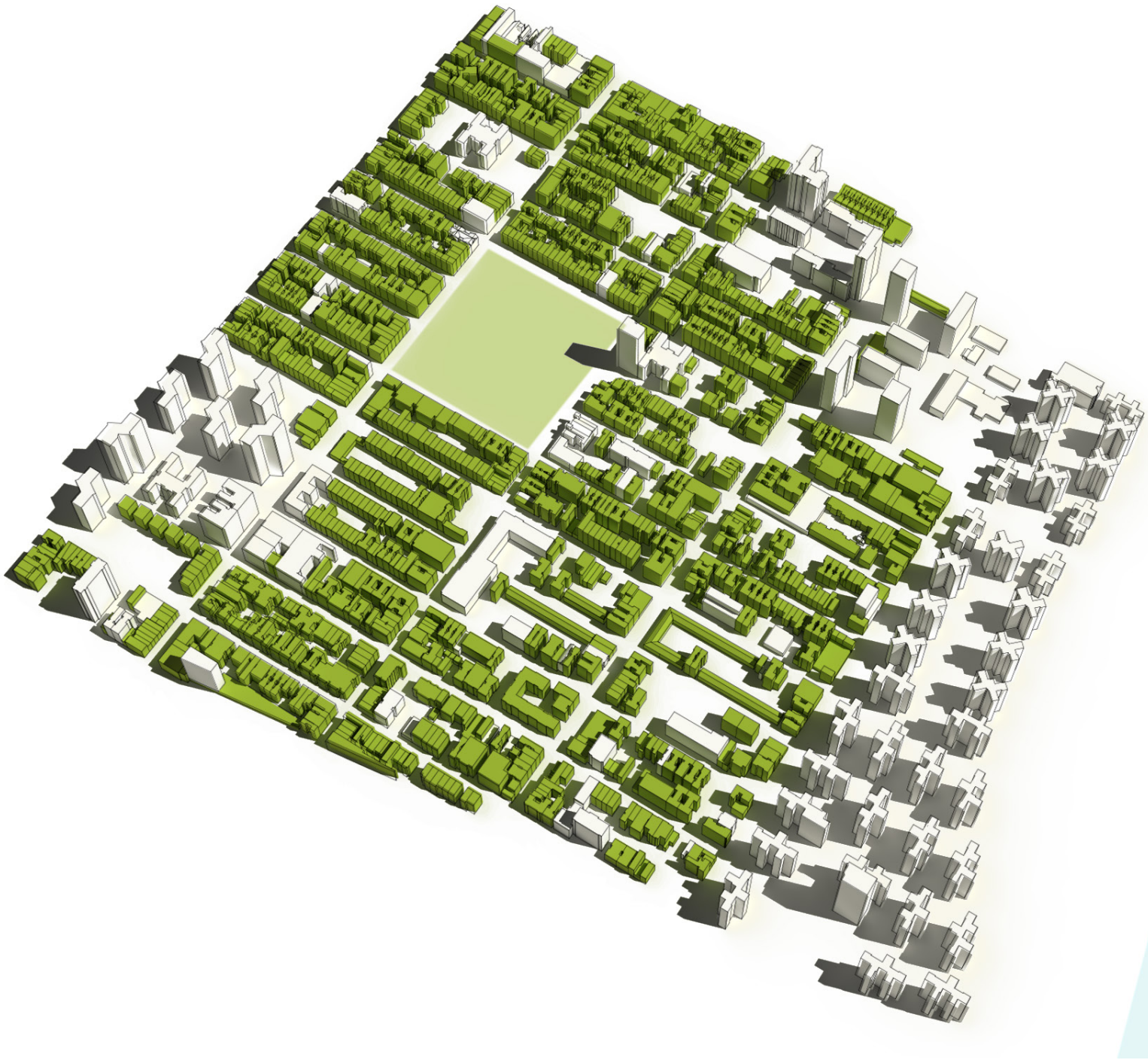


November 1pm



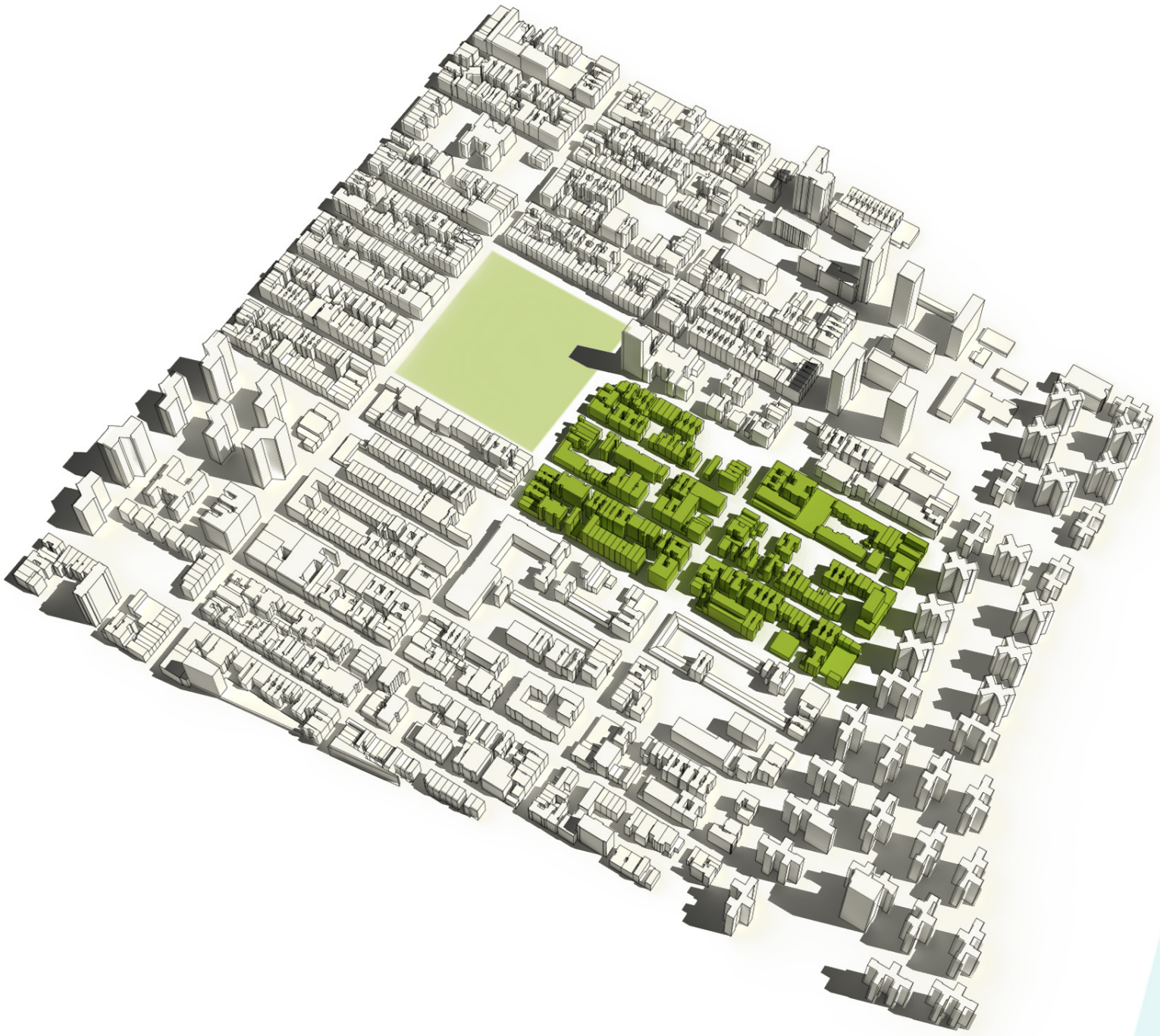
November 5pm

BUILDINGS BELOW MAXIMUM HEIGHT LIMIT



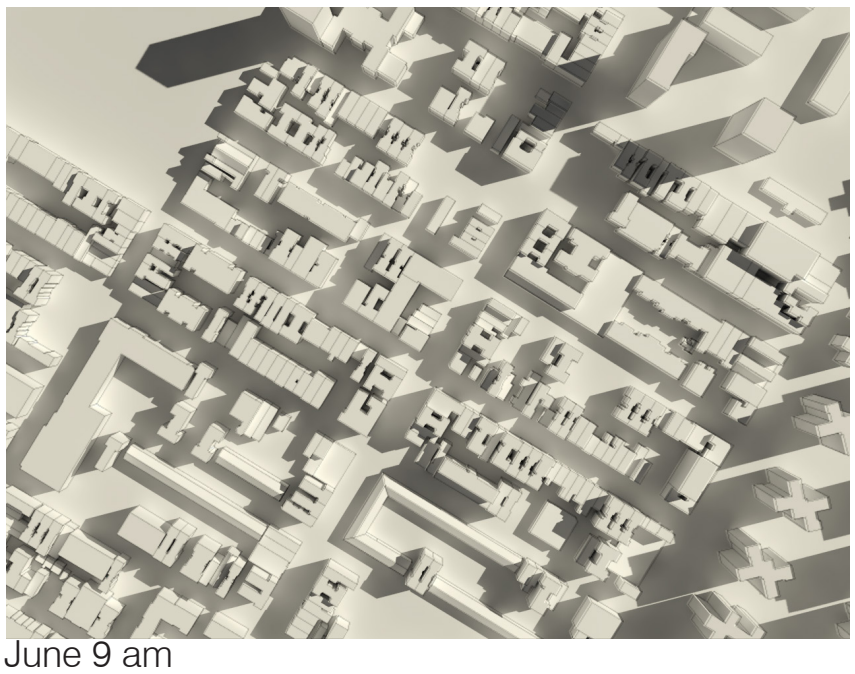
BUILDINGS BELOW MAXIMUM BASE HEIGHT LIMIT

SELECTED SIX BLOCKS

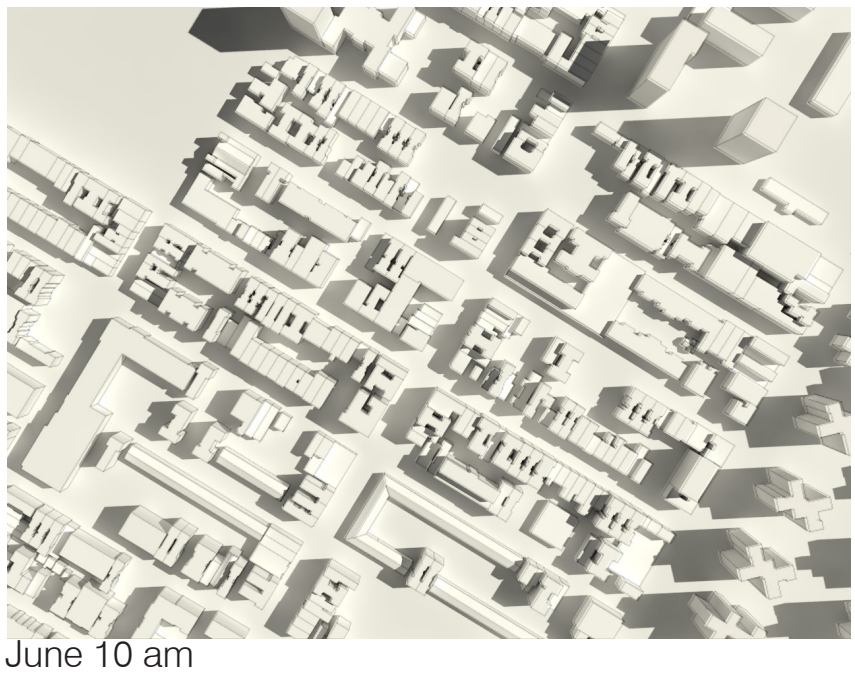


ZONING MAP

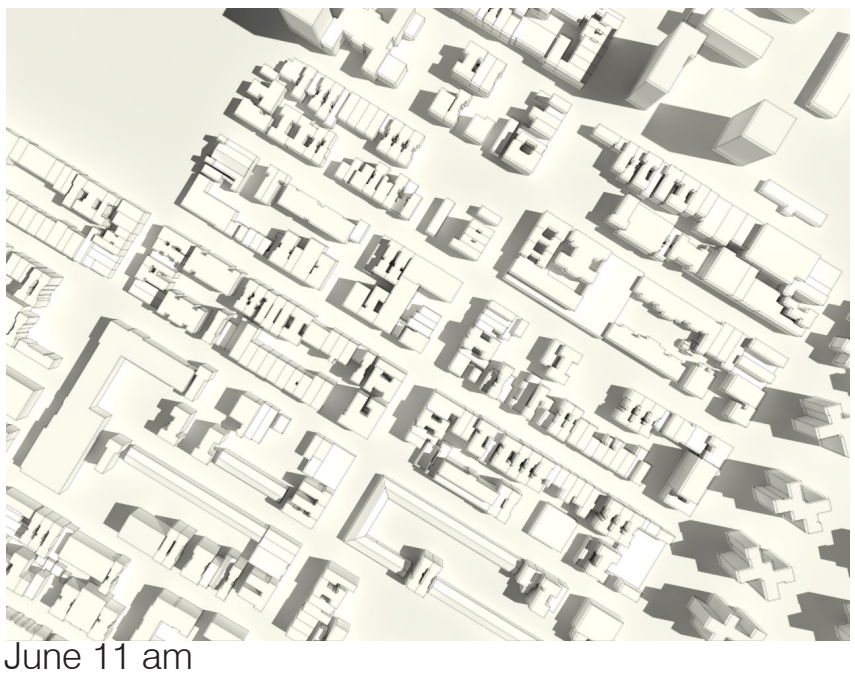
HOURLY SUN ANALYSIS - SUMMER



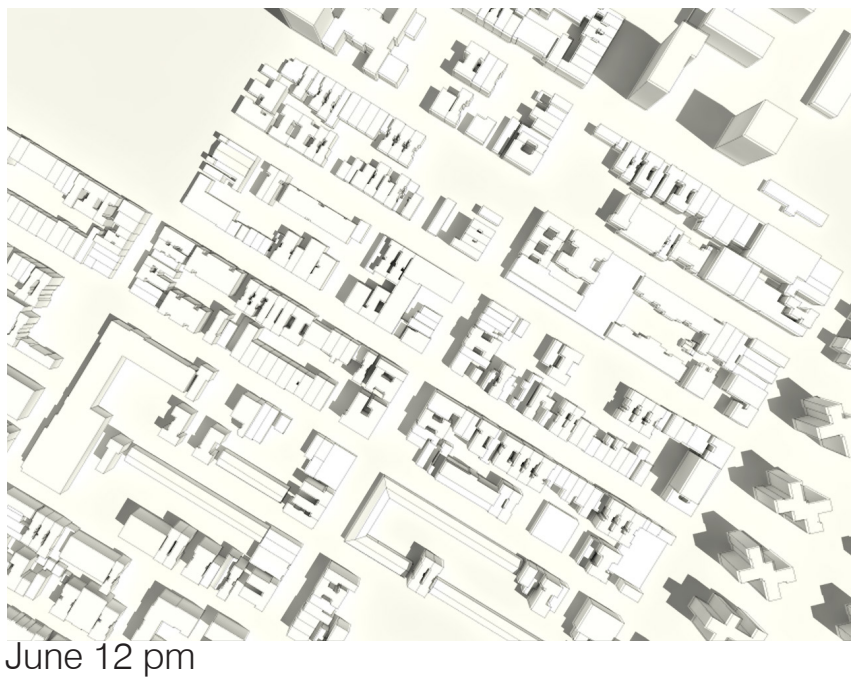
June 9 am



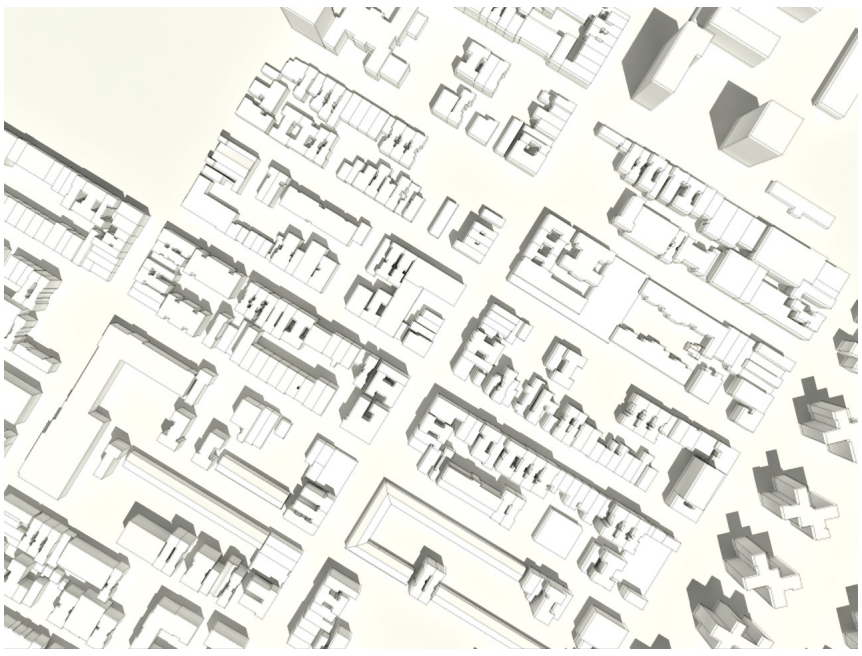
June 10 am



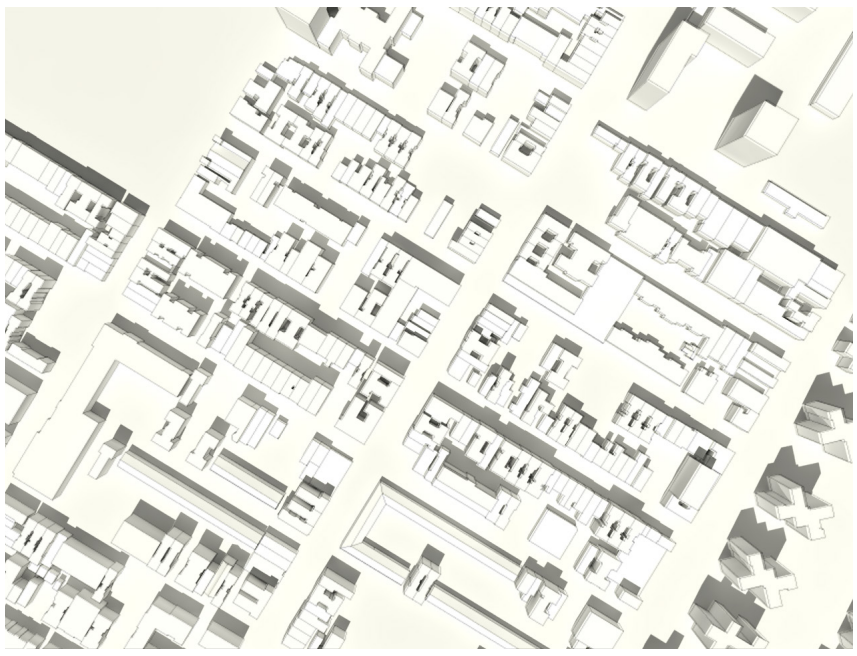
June 11 am



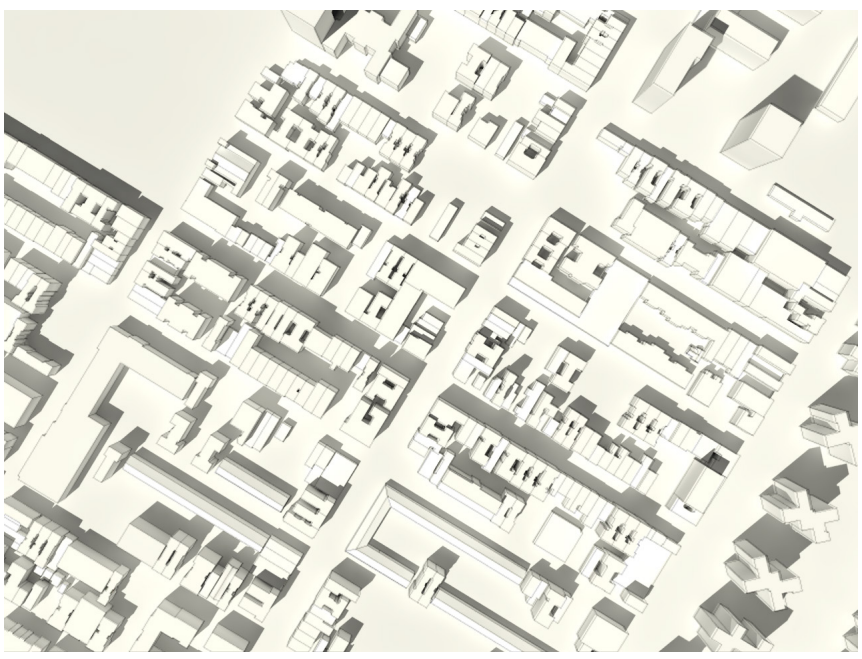
June 12 pm



June 1 pm



June 2 pm

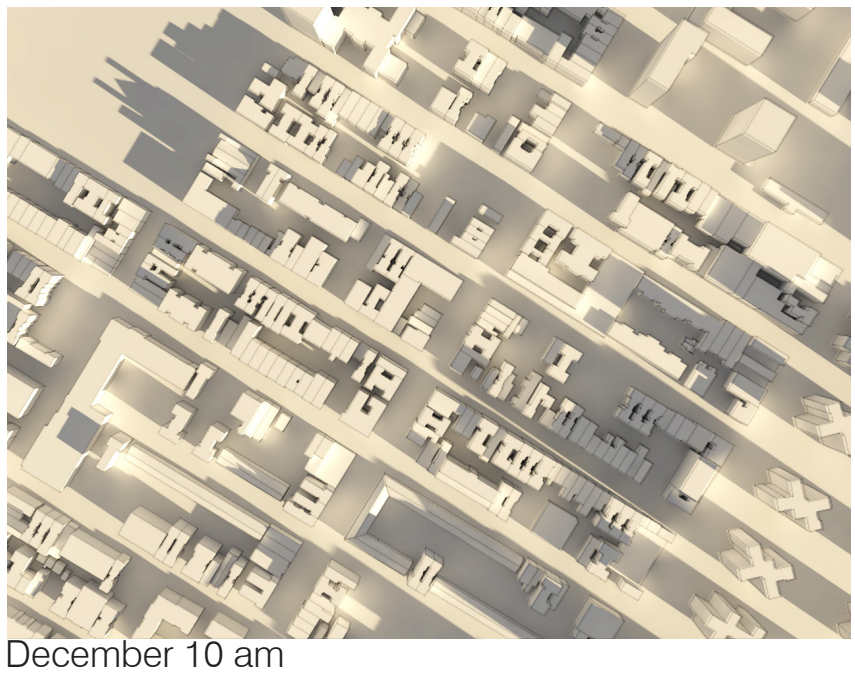


June 3 pm

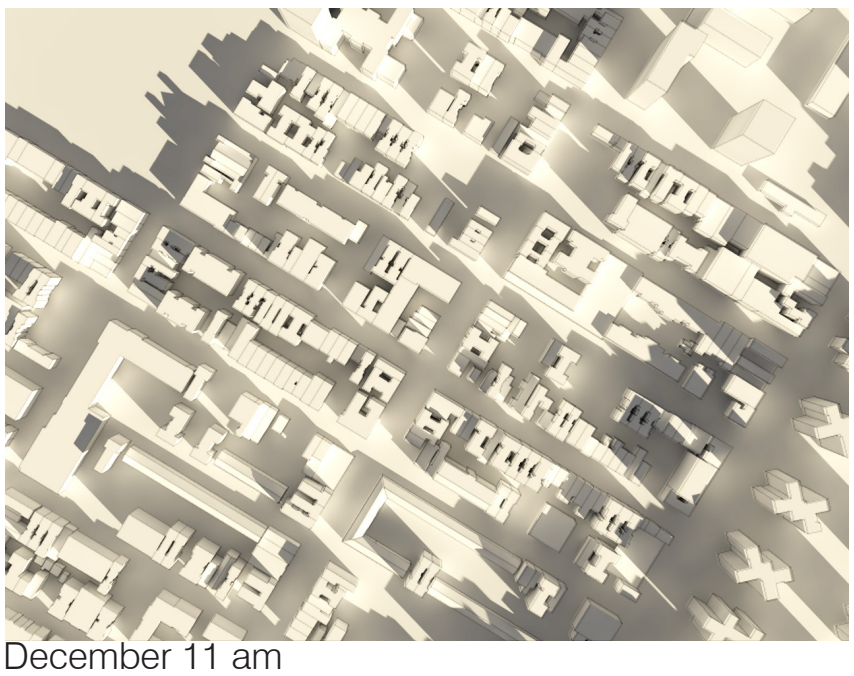
June 4 pm

HOURLY SUN ANALYSIS - WINTER

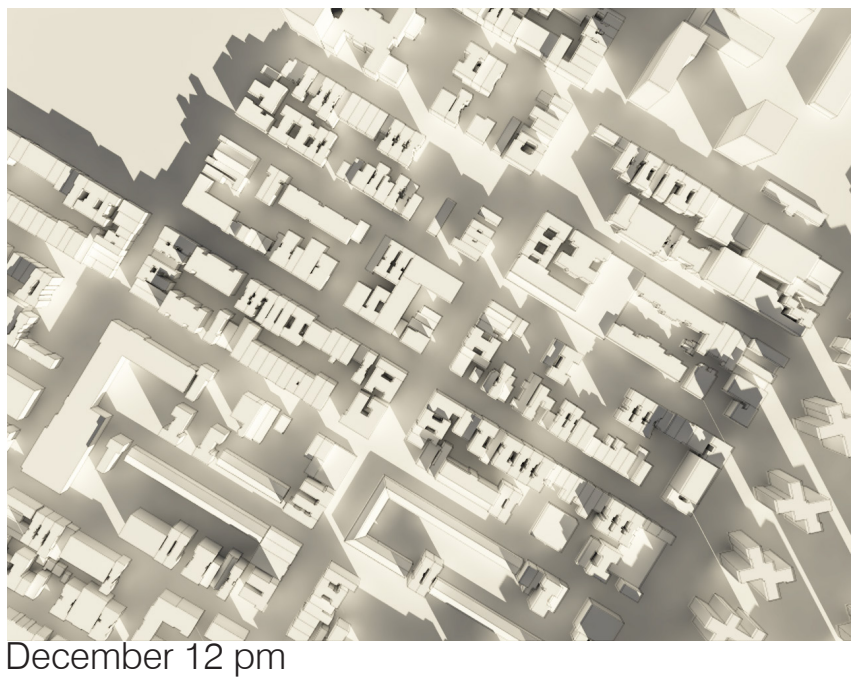
December 9 am



December 10 am



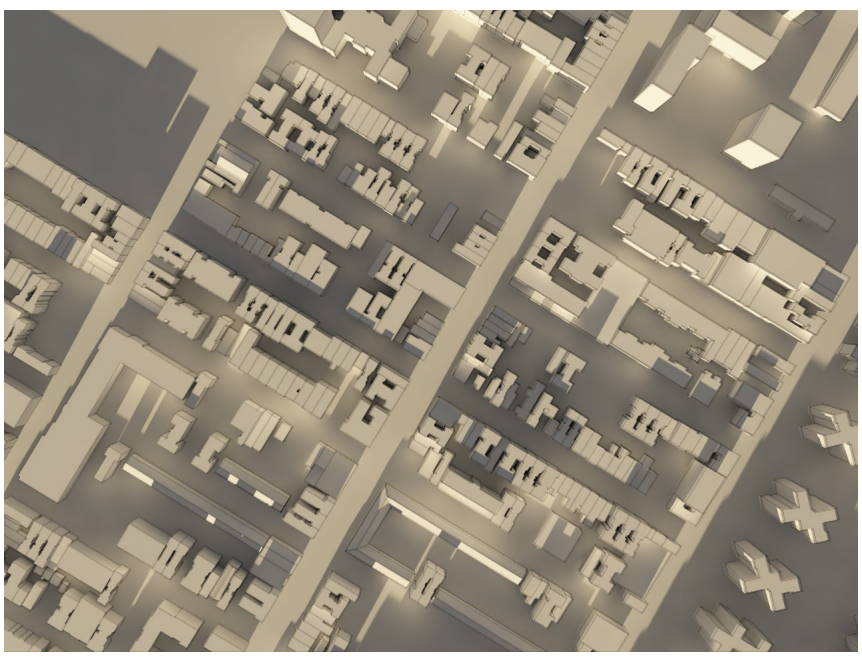
December 11 am



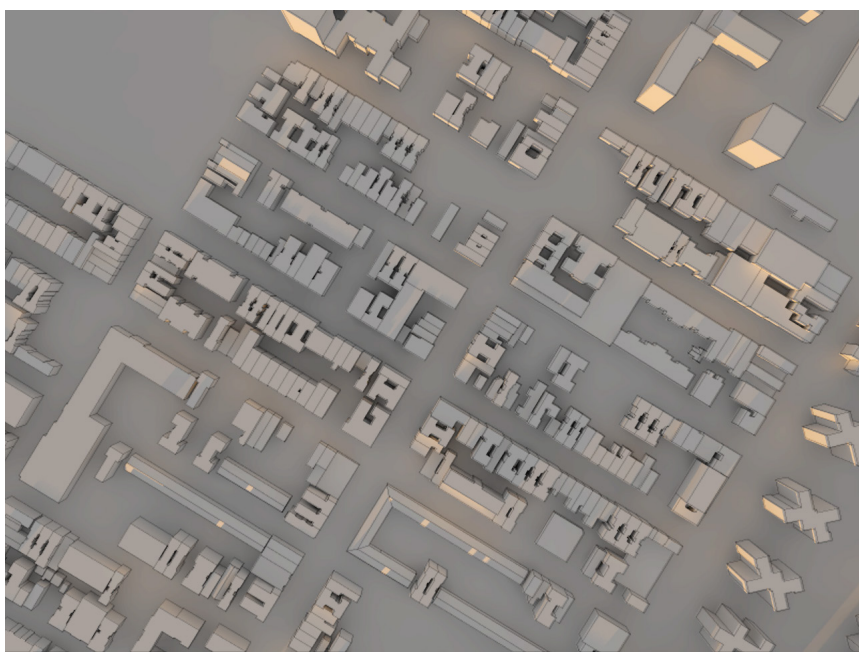
December 12 pm

December 1 pm

December 2 pm



December 3 pm



December 4 pm

WHAT

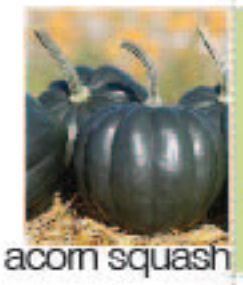
Plant Matrix
Program around the site
Programmatic relationships in Sitopia

*some icons ae taken from nounproject

ALLIUMS

 leek	1-1/2" – 2-1/2"		1" per week	dry mulched	45 F°	50-80d
 red onion				dry		110-125 d
 scallion	1'			dry	50 F°	6"
 white onion				dry		110-125 d

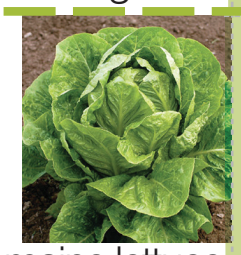
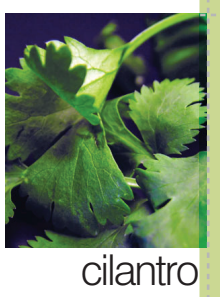
CUCURBITS

 acorn squash	2'-3' × 10'	min 6 hrs	1" per week	well drained fertile high organic matter	60 F°	80-100 d
bittergourd	10"		constant moisture	rich free draining moisture retentive	65 F°	2 months after snow-ing
 butternut squash	10'	min 6 hrs	constant moisture	well drained fertile high organic matter	65 F°	90-100 d
 cantaloupe	10'	min 6 hrs	1" per week	well drained high organic matter	65 F°	60-80 d
 pumpkins	5-'12'	min 6 hrs	1" per week	fertile high organic matter	65 F°	100-120d
 spaghetti squash	8'	min 6 hrs	constant moisture	well drained fertile high organic matter	65 F°	100 d

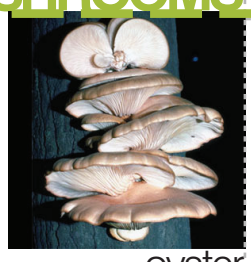
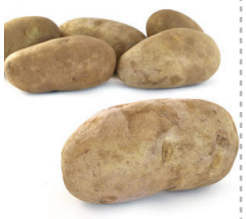
*some icons are taken from nounproject

 cucumbers	8’	min 8 hrs	weekly	well drained high organic matter	60 F°	50-65 d
 watermelon	10’	min 6 hrs	1” per week	well drained high organic matter	65 F°	80-100 d
 zucchini	18” 36”	min 6 hrs	1” per week	well drained high organic matter		50-60 d
GREEN & BRASSICAS						
 arugula	12” 18”		1” per week	well drained high organic matter	spring early fall	35 d
 bok choy	4” 12”	min 6 hrs	1” per week	well drained high organic matter high in N	early spring late july	40-50 d
 broccoli	18” 30”	min 6 hrs	1” per week	well drained high organic matter	mid march mid april	55-80 d
 broccoli rabe	12”		constant moisture	fertile moist		6”
 cabbage	10” 12”	min 6 hrs	1” per week	well drained high organic matter	march - may	60-70 d
 cardoon	4’ 2’		regular watering	well drained high organic matter		3-4 wks
 cauliflower	12” 18”	min 6 hrs	1” per week	well drained high organic matter	mid march - may	50-90 d

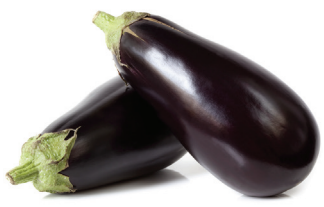
some icons ae taken from nounproject

 collards	12” 24”	min 6 hrs	1” per week	fertile moderately rich	70 F°	50-60d
 kale	10” 30”		1” per week	well drained high organic matter	early spring mid july	8” 15”
 kohlrabi	12” 24”	min 6 hrs	1” per week	fertile moderately rich	late july early august	3”
 mustard greens	12” 24”	min 6 hrs	1” per week	well drained high organic matter	40-70 F°	40-50 d
 romaine lettuce	8” 10”		1” per week	well drained high organic matter	40 F°	50-60 d
 spinach	10” 12”		1” per week	fertile high in	55-65 F	30-40 d
 swiss chard	12” 24”	min 6 hrs	1” per week	well drained high organic matter	50-75 F°	1” 2”
 turnips	12”		1” per week	well drained high organic matter	70 F°	30-40 d
HERBS						
 basil	12” 30”	min 6 hrs	1” per week	well drained not hea ily fertili ed		30-100 d
 cilantro	6” 12”		1” per week	well drained high organic matter		before flowers

some icons ae taken from nounpro ect

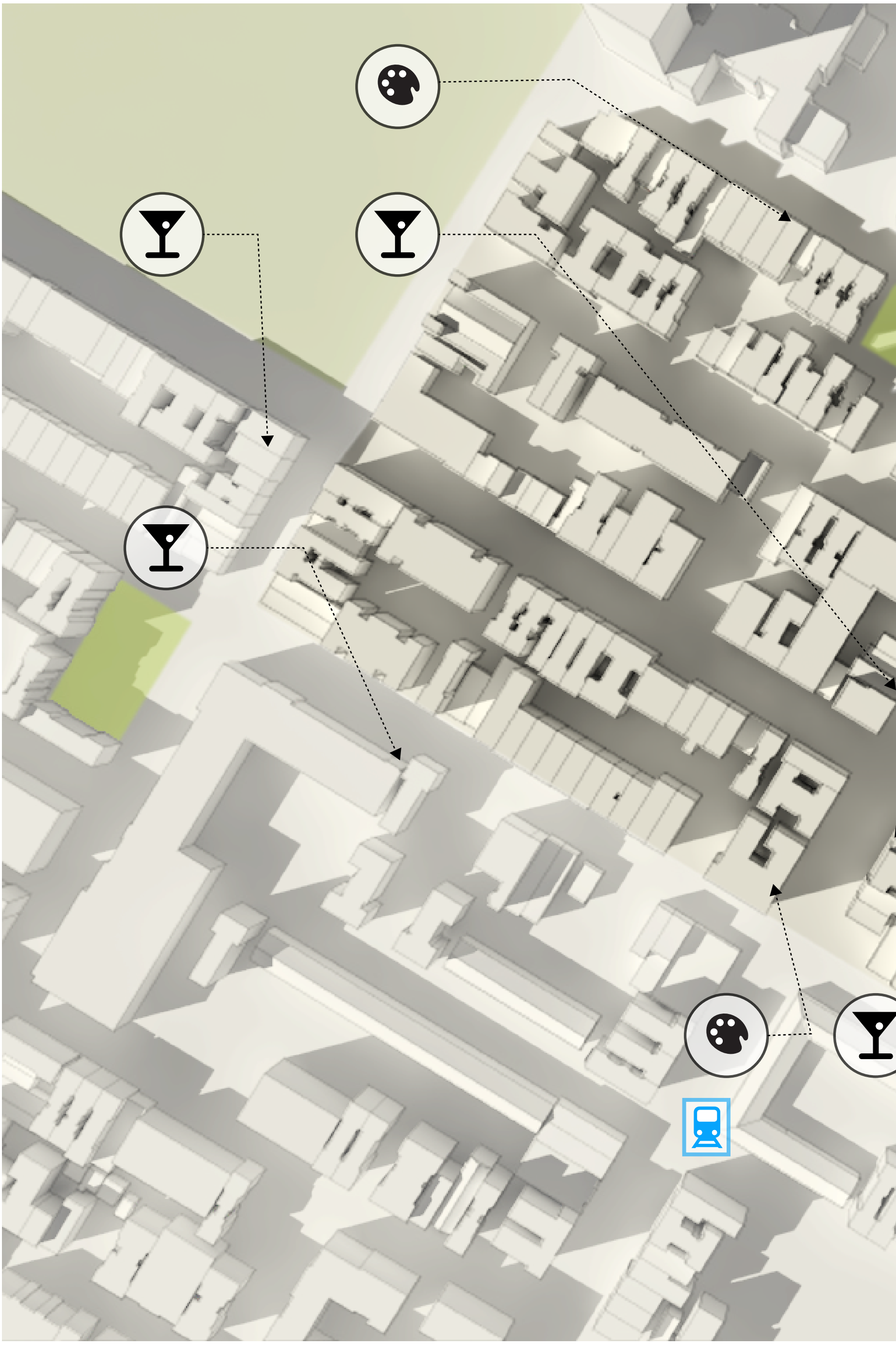
 black-eyed peas	30” 36”		very moist	well drained sandy		90-100 d
 fava beans	18” 25”		evenly moist	well drained extra K		6”
MUSHROOMS						
 oyster	2” 8”		every other day			20-35 d
 shiitake	2” 5”	72 F - 78 F	%35-%45			1 yr
TUBERS						
 russet burbank	4” 6”		1” - 1-1/2” per week	well drained slightly acidic		15 d
 sweet potato	6” 8”		1” per week	well drained warm		100- 140 d
 yukon gold	3” 5”		1” per week	well drained slightly acidic		90 - 100 d
ROOTS						
 carrots	1-1/2”		1” per week	sandy neutral		2 months
 celery			1” per week	sandy moist rich		as needed

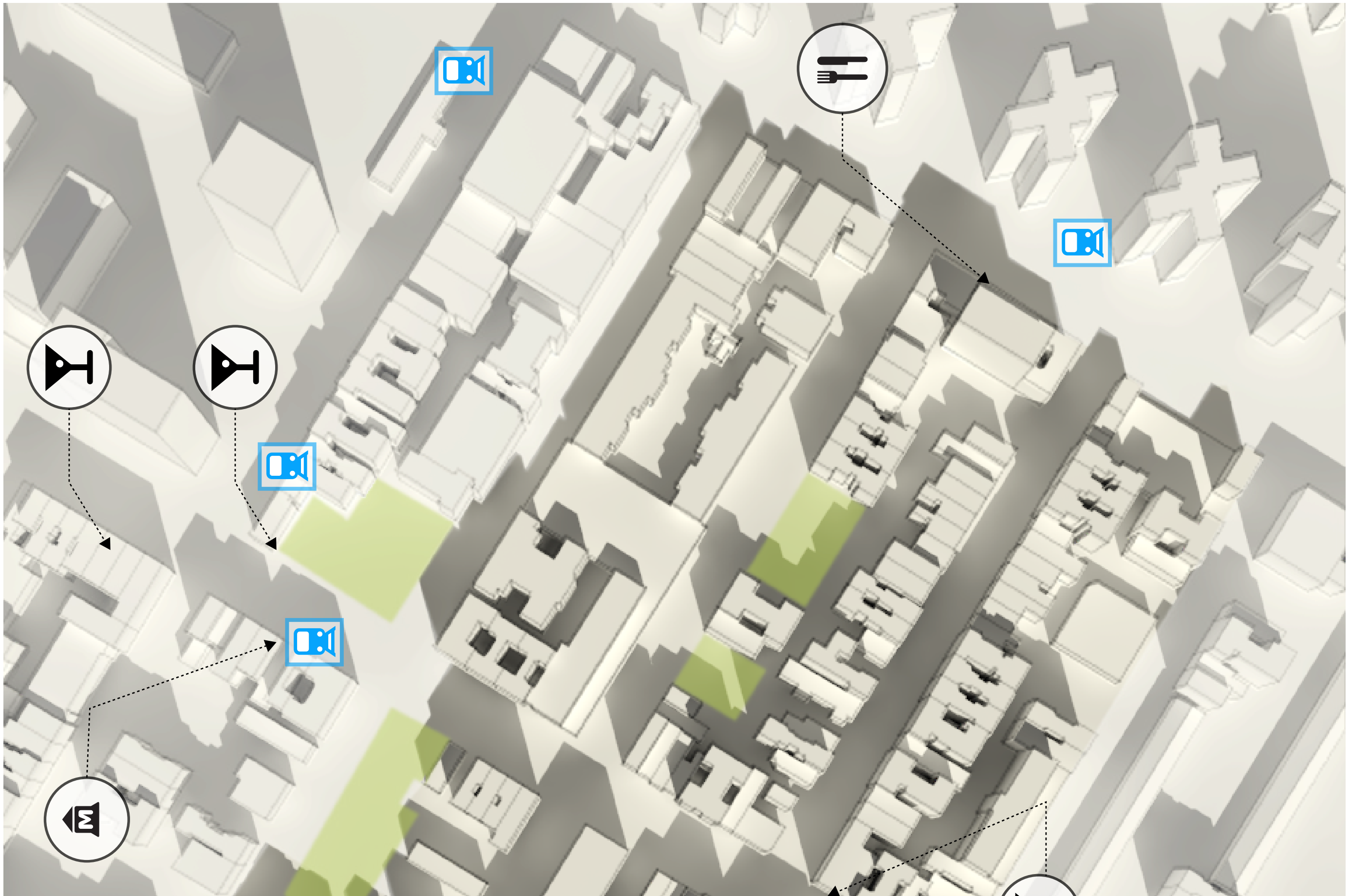
some icons ae taken from nounproject

 corn			regular watering	loamy neutral		tassels turn brown
 eggplant			regular watering	loamy acidic	indoor 2 m before soil warms up	+ 16 - 24 w
habanero						
 jalapeno						
 parsnip			1” per week	loamy sandy acidic	as soon as soil is workable	
 peas			sparsly	well drained sandy basic	+ 45 F°	well peaked
 sweet peppers			1”-2” per week	loamy neutral		as soon as desirable size is reached
 tomato			regular watering	loamy acidic		when ripen
FRUITS						
 blackberry			1” per week	sandy acidic		as needed
 blueberry			1”-2” per week	well drained acidic	as soon as soil is workable	

some icons ae taken rom nounpro e

 currant		1”-2” per week	well drained acidic	as soon as soil is workable	
 elderberry		1”-2” per week	well drained acidic	as soon as soil is workable	
 gooseberry		1”-2” per week	well drained acidic	as soon as soil is workable	
 grape		even moisture	slightly acidic to neutral		when ripen
 kiwi					
 honeydew	min 6 hrs	1” per week	well drained	65 F°	80-100 d
 raspberry		1” per week	slightly acidic to neutral		when ripen
 rhubarb		even moisture	well drained fertile	40 F° -75 F°	10” 18”
 strawberry		1” per week	slightly acidic to neutral		4 - 6 w





PRODUCTION

FARM
GARDEN

AGENCY

GROCERY STORE
SUPERMARKET
HEALTHY BODEGAS
CORNER STORES

CONSUMPTION

HOUSE

SITOPIA

FARM
GARDEN

GROCERY STORE
SUPERMARKET
HEALTHY BODEGAS
CORNER STORES

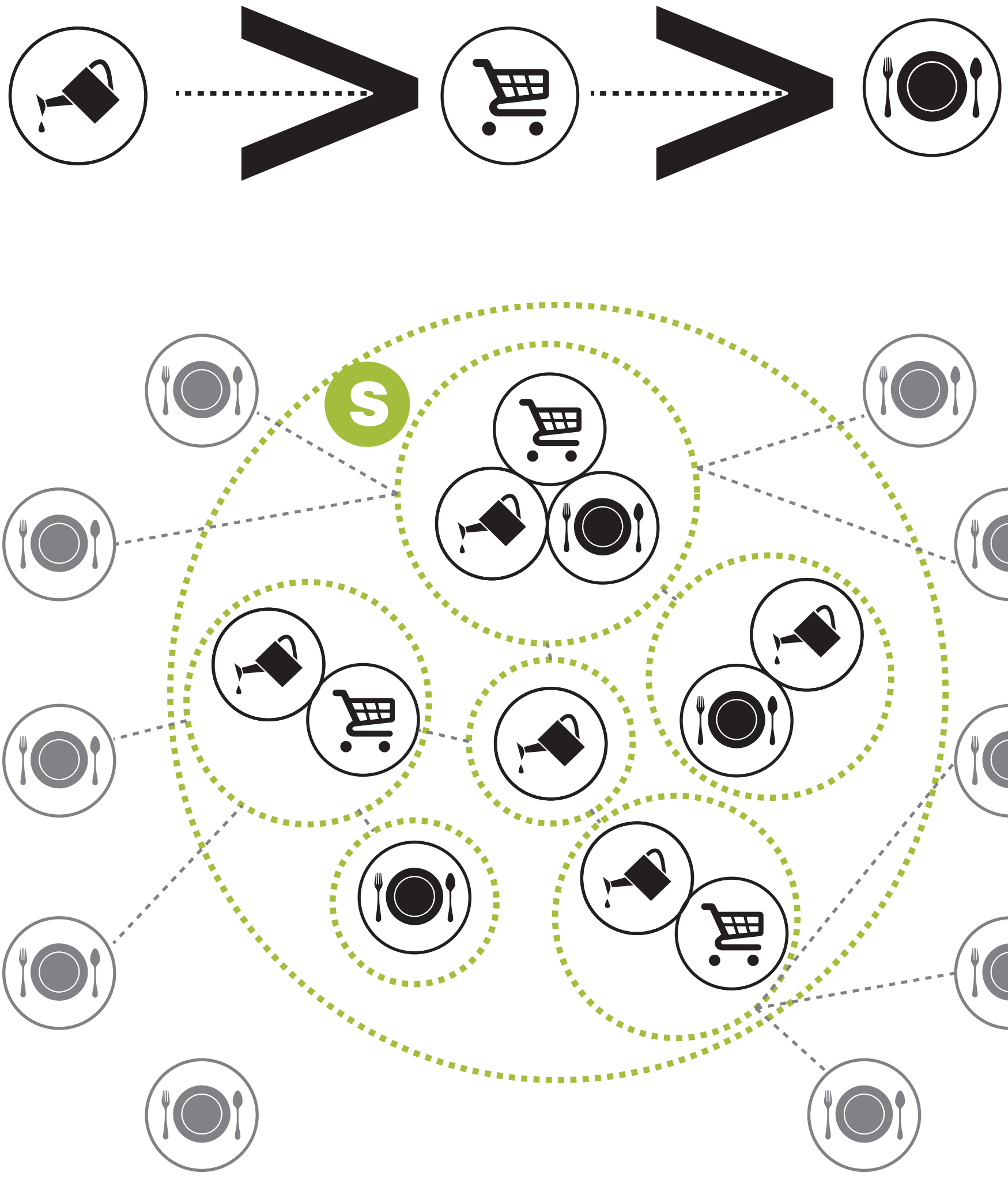
HOUSE

CIRCULATION
STRUCTURE
STORAGE

Today fresh organic food follows a linear path from production to consumption; passing through an agency, programmed as grocery stores, supermarkets, corner stores, healthy bodegas and so on. Sitopia suggests overlaying of production, transaction and consumption through merging these programs together. Therefore, architectural contention comes into place in two facets within the project.

The fist way in which the spaces are challenged is through implementation of agriculture; an additional system with its own requirements. While the first question that arises is how can existing architecture be manipulated in order to house farming; the second one is what is the role of architecture as a catalyst between the private realm that is the residences and the public that is the transaction space.

Garden zones within residences implies a privatized individualized spaces that works solely within the perimeter of the house. One can ask, why not implement this system within the commercial districts that are inherently public. Even though; commercial districts don't have the public, private clash introduced by Sitopia, due to the height of buildings, sun exposure is limited. Furthermore, the food system that Sitopia builds off of is situated around the residential zones; not the commercial ones. In other words, the second challenge is understanding of Sitopia as neither public nor private but as a threshold in between. While the primary programs are production and transaction zones, accessory programs such as circulation and storage, are needed to support and emphasize the link between individual garden spaces.


S

HOW

TABLE OF CONTENTS

Machinery
Metals
Millwork (sash & door)
Motion pictures and television filming (without spectators)
Musical instruments
Optical goods
Paper mills or products
Photographic film
Plastic products
Printing or publishing
Recreational vehicles
Refuse incineration
Shoes
Soaps and detergents
Textiles
Tobacco
Trailers
Upholstering
Wood; distillation
Woodworking (cabinet)

306.3 Factory Industrial F-2 Low-Hazard Occupancy. Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

Beverages; up to and including 12-percent alcohol content
Brick and masonry
Ceramic products
Foundries
Glass products
Gypsum
Ice
Metal products (fabrication and assembly)

SECTION 307
AGRICULTURE GROUP G

307.1 Agriculture Group G. Agriculture Group G occupancy includes, among others, the use of a building or structure, or a portion thereof, for gathering of persons for purposes of agricultural activities such as produce of crops, cultivation of indoor or outdoor gardening, and seed nursery.

Exceptions:

1. A building or portion of a building used for storage of agricultural produce shall be classified as Group S occupancy or part of that occupancy.
2. Nurseries with a packaging and processing component shall be classified as Group F occupancy or part of that occupancy.

G-1 Agricultural activities occuring autonomously including, but not limited to:

Greenhouses
Vertical Farms
Factory Farms

G-2 Agricultural activities occuring subserviently with other occupancies such as Group B, I or R including, but not limited to:

Home Garden
Educational Garden
Work Garden

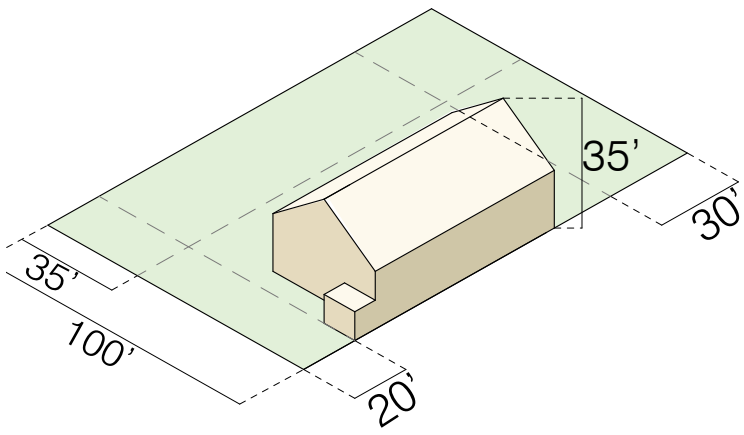
SECTION 308
HIGH-HAZARD GROUP H

[F] 307.1 High-Hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in control areas constructed and located as required in Section 414. Hazardous uses are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *Fire Code of New York State*.

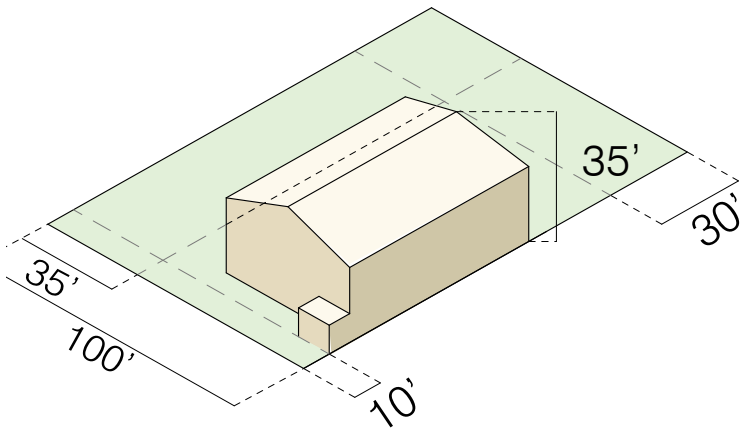
Exceptions: The following shall not be classified in Group H, but shall be classified in the occupancy that they most nearly resemble:

1. Buildings and structures that contain not more than the maximum allowable quantities per control area of hazardous materials as shown in Tables 307.1(1) and 307.1(2), provided that such buildings are maintained in accordance with the *Fire Code of New York State*.
2. Buildings utilizing control areas in accordance with Section 414.2 that contain not more than the maximum allowable quantities per control area of hazardous materials as shown in Tables 307.1(1) and 307.1(2).
3. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *Fire Code of New York State*.

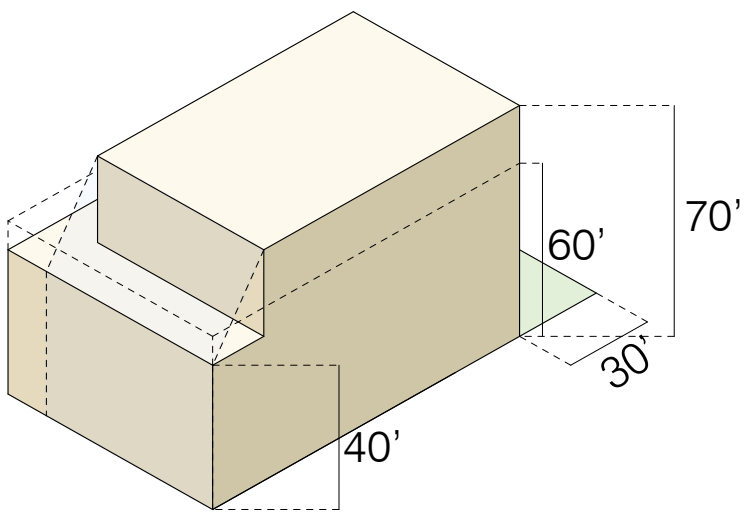
GLOSSARY
EXISTING REQUIREMENTS



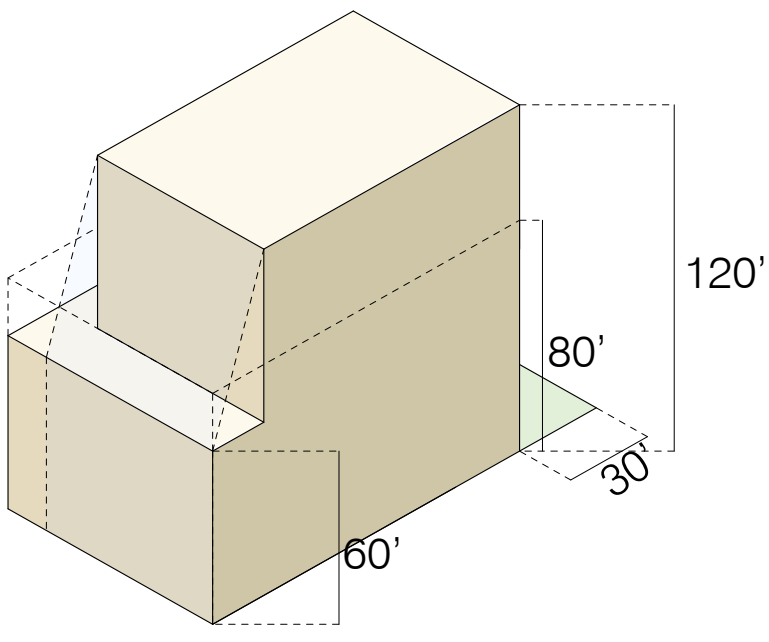
R1-R3 zones are lower density residential districts; housing single and two family housing units. Subcategories of these zones are R1-1, R1-2, R1-2A, R2, R2A, R2X, R2A, R2X, R3A, R3X, R3-1 and R3-2. These single or two family housing units can be detached or semi-detached. FAR (floor area ratio) is 0.5 with the exception of R2X in which FAR is 0.85. The lot width varies from 100’ to 40’. There are additional requirements for the width of front, side and rear yards which are different in regards to each subcategory. While the maximum lot coverage R1-2A and R2A is 30% and 35% in R3-1 and R3-2; lot coverage in rest of the subcategories is measured according to yard requirements. Similarly, building height is 35’ except in R1-1, R2-1 and R2A the height is determined according to the sky exposure plane.



R4-R5 zones are lower density residential districts; housing single and two family housing units. Subcategories of these zones are R4, R4-1, R4A, R4B, R4/R5 infill, R5, R5A, R5B, R5D. These single or two family housing units can be detached or semi-detached. The lot width varies from 40’ to 25’. There are additional requirements for the width of front, side and rear yards which are different in regards to each subcategory. While the maximum lot coverage is 45% in R4; 55% in R4B, R4/R5 infill, R5, R5A, R5B; and 80% (corner lot), 60% (interior lot) in R5D, within the rest of the categories lot coverage is determined by the width of the yards. The width and the number of side yards change in each category while the width of the rear yard is 30’ throughout. The maximum building height varies from 40’ to 24’.

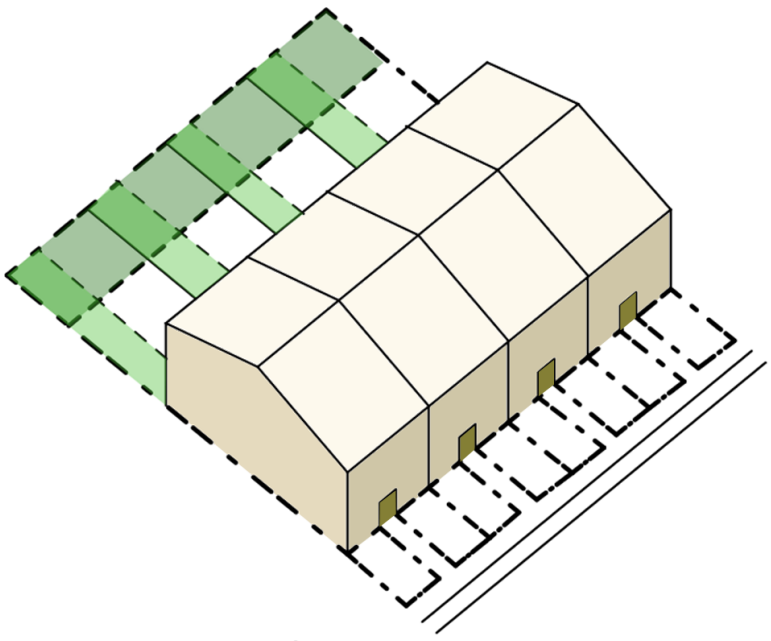


R6- R7 zones are medium density residential districts. Subcategories of these districts are R6HF, R6QH, R6A, R6B, R7HF, R7QH, R7-3, R7A, R7B, R7D and R7X. FAR changes from 5.0 to 0.78 according to the subcategory. In R6QH and R7QH FAR is different for wide street facing and narrow street facing buildings. Corner lot coverage is 80% with the exception of R6HF and R7HF while interior lot coverage ranges from 60%-70%. Building height also differs according to each subcategory from 125’ to 55’ with the exception of R6HF and R7HF in which the height is determined according to the sky exposure plane. There are no front and side yard regulations; however, minimum rear yard depth is 30’.

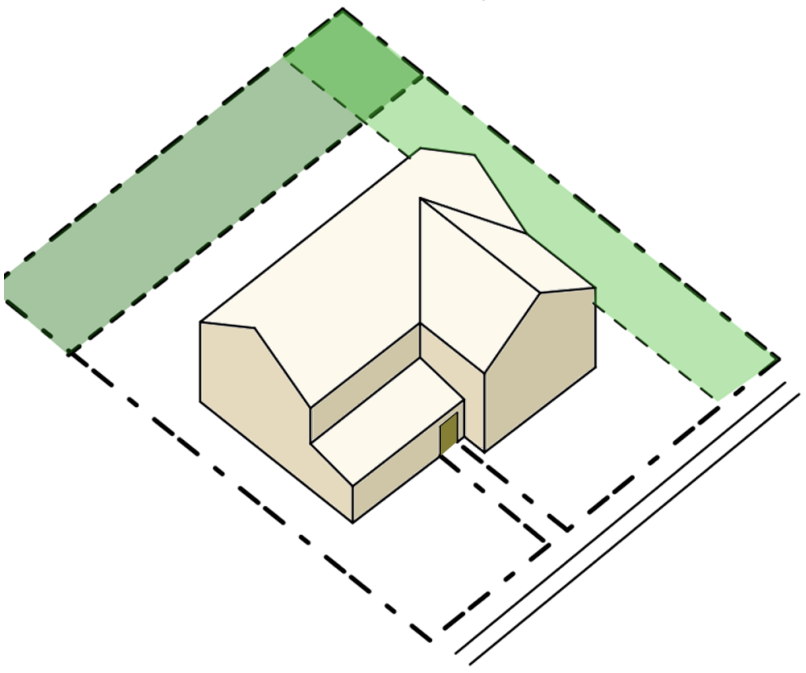


R8-R10 zones are higher density residential districts. Subcategories of these districts are R8HF, R8QH, R8A, R8B, R8X, R9HF, R9QH/R9A, R9-1, R9, R9X, R10, R10QH/R10A R10X. FAR ratio changes from 0.94 - 10 depending on the subcategory. Maximum lot coverage for corner lots is 80% with the exception of R8HF, R9HF and R10 where it is not specified; R9-1 where its 70% and R10QH and R10X where its 100%. Maximum lot coverage for interior lots are 70% except R8HF, R9HF and R10 where its not specified. Maximum building height requirements vary from 280’ to 75’. In R8HF the building height is determined by the sky exposure plane where as in R9HF it’s either according to the sky exposure plane or tower rules and in R10 and R10X it’s due to tower rules. The only required yard is the rear yard and the depth of the rear yard is 30’ throughout.

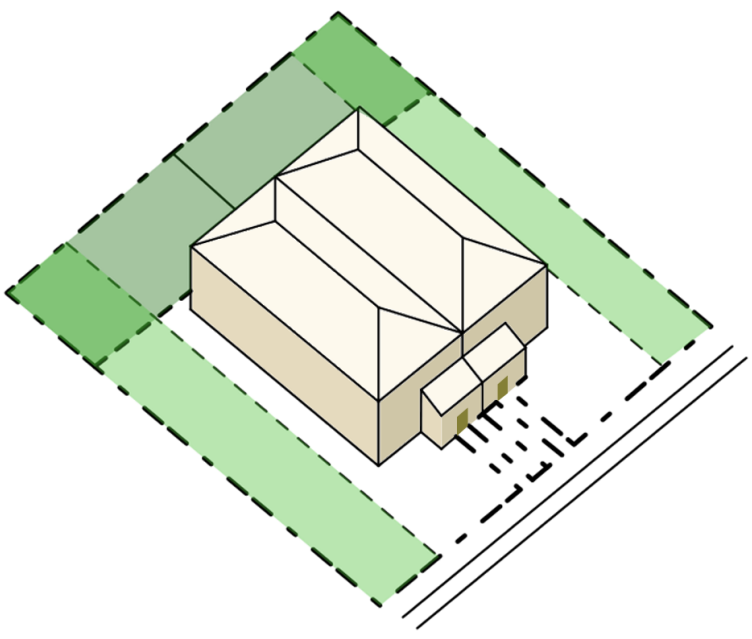
YARD REVISIONS



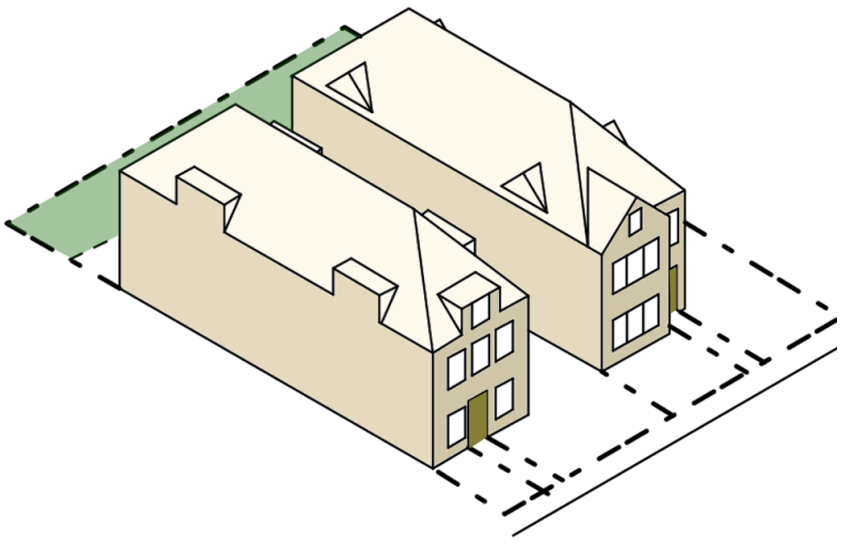
In housing districts with attached and semi detached housing units, side and rear yards can be converted into green occupancies. In the instance where the yards are converted into G group, it will not be regarded as an obstruction of the code.



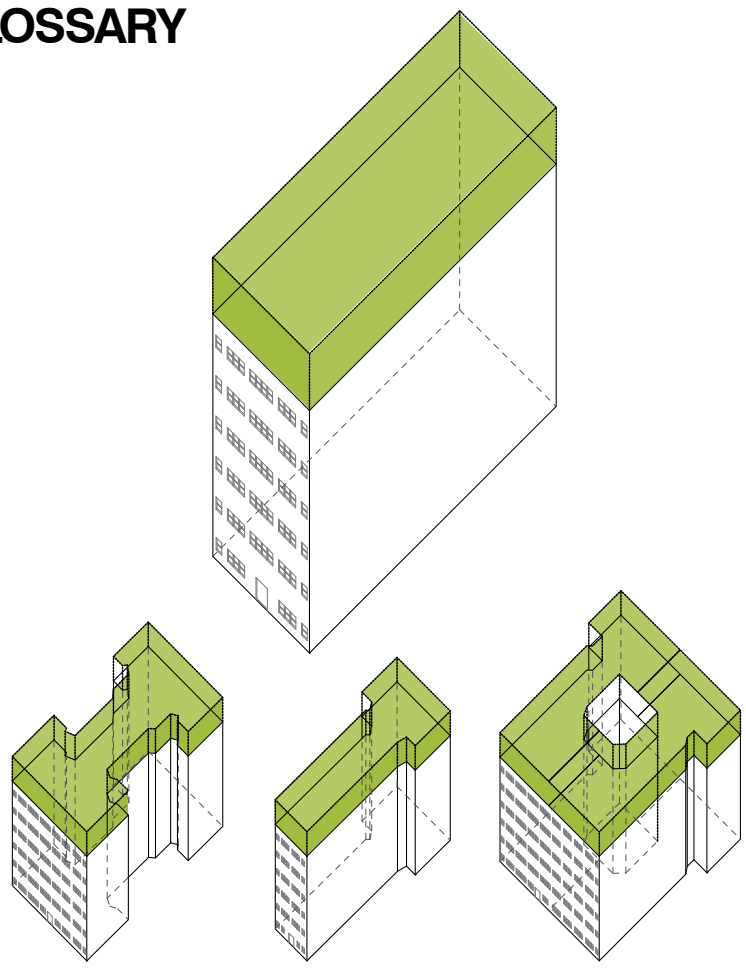
In residence districts with single housing units, front, side and rear yards can be converted into G group. in subcategories where multiple side yards are required, G group side yards are regarded as an exception; thus utilization of a singular side yard with maximum width is accepted.



Enclosed G groups can be accepted as open space areas when the exposure to sky is unobstructed.

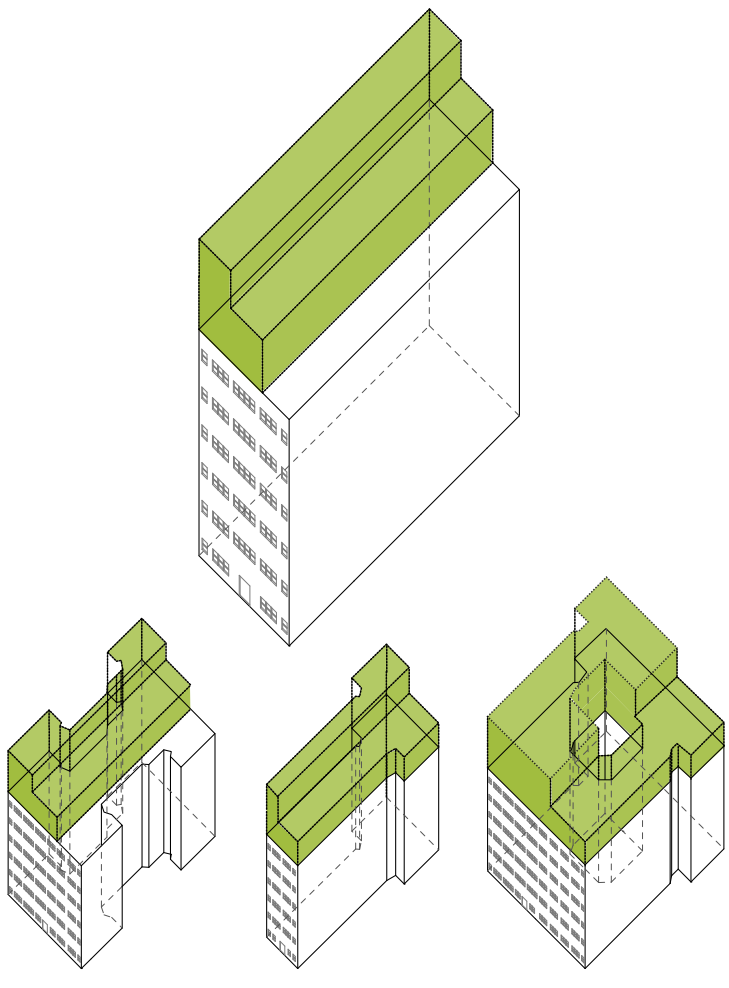


GLOSSARY



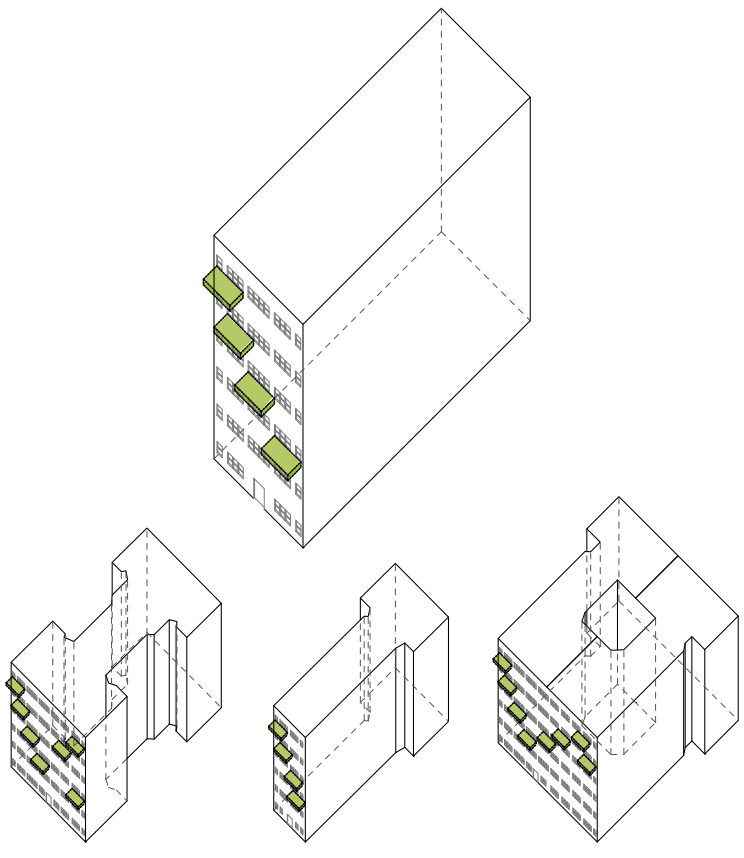
OPTION A

When the existing structure is below the maximum height requirement; additional G grouped floors can be added above the existing structure. If the existing building requires additional structural support for the implementation; yards can be utilized for housing accessory G zones such as structure and circulation. If a side yard for such implementation is not available, negative spaces in between two adjacent buildings can be used for accessory programs.



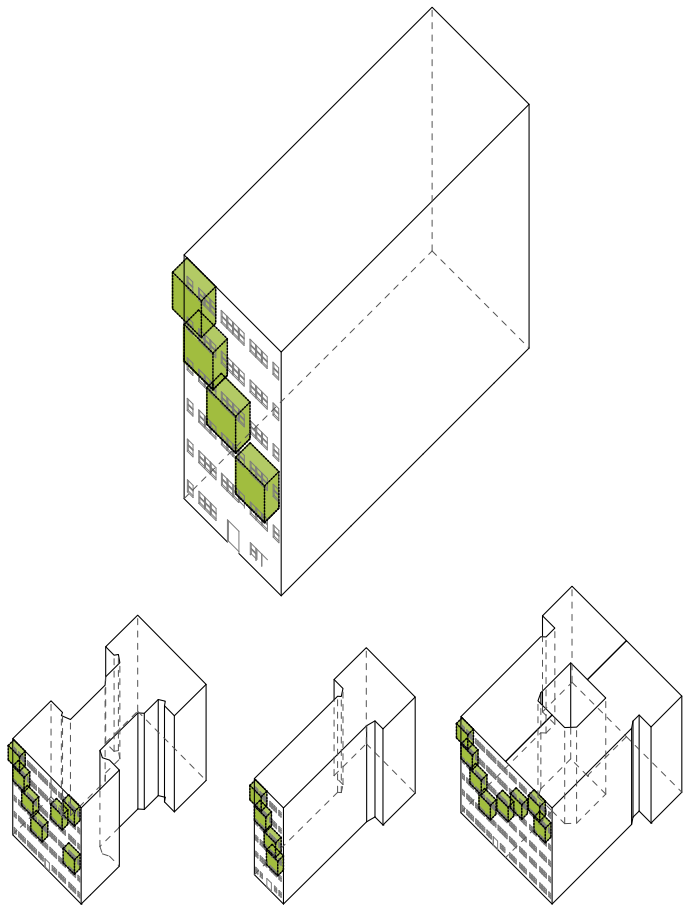
OPTION B

When the existing structure satisfies the maximum height requirement; only a singular full level of G group can be added with regards to the sky exposure plane. If the sky exposure plane is obstructed due to the addition of an entire level; additional levels must follow setback requirements. Yards can be used similar for similar purposes mention in Option A.



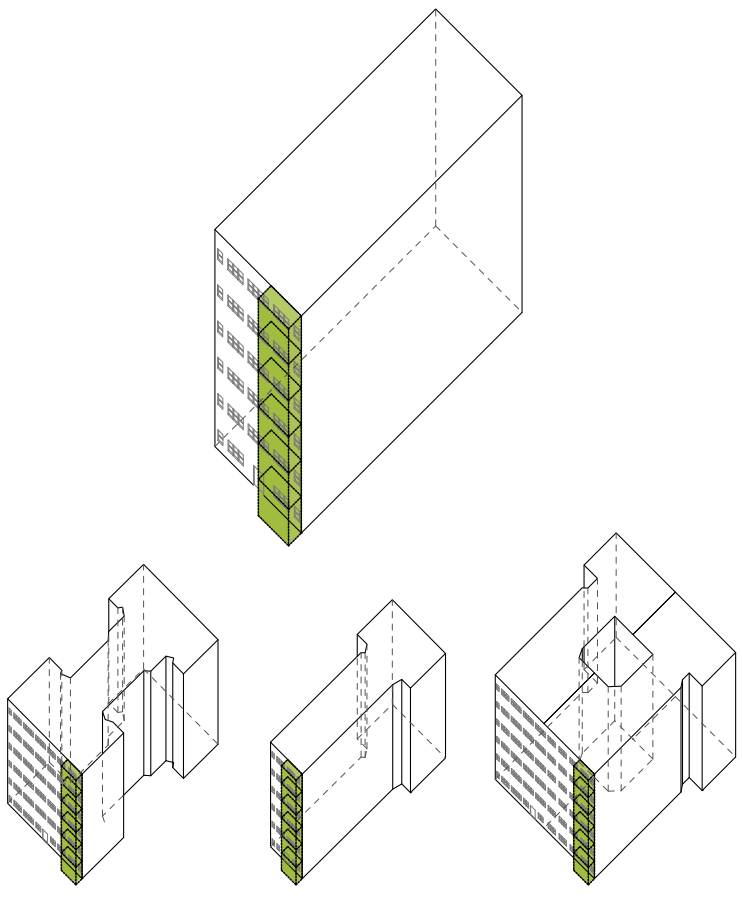
OPTION C

Obstruction of sidewalks are permitted up until 10’ if the extruded structures are used as G group balconies. However, the use of G group balconies are permitted 20’ above the curb level. Occupied balconies must utilize guard rails. In the instance where gardening containers are regarded as the guardrails, the containers must be at least 3’6” high from the floor level and it must be connected to the floor.



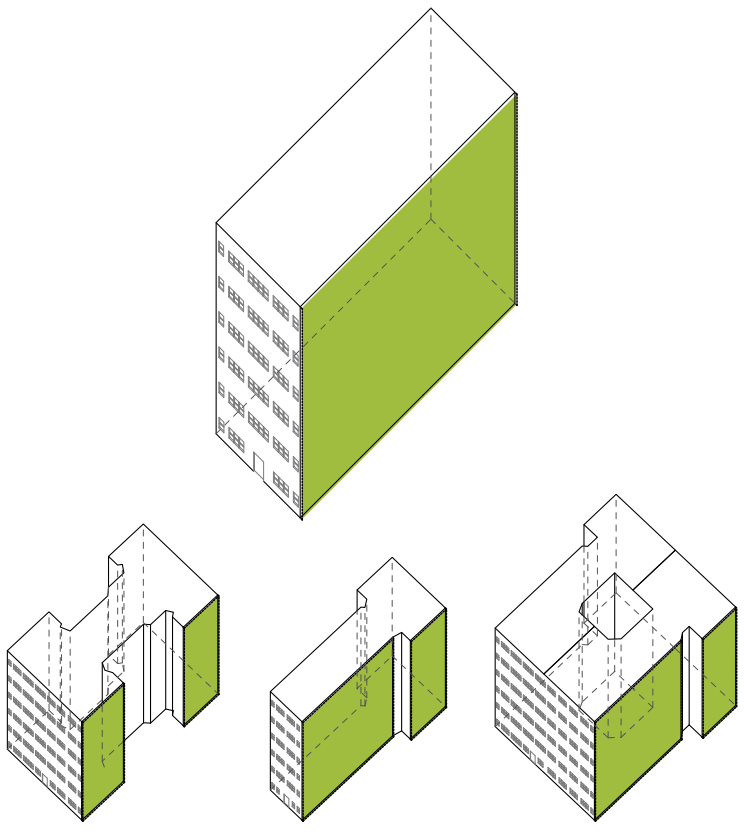
OPTION D

Obstruction of sidewalks are permitted up until 10’ if the extruded structures are used as G group balconies. However, the use of G group sun spaces are permitted 20’ above the curb level. The height of the sun space must be determined according to the ceiling height. The angle of the ceiling of the sun space must be determined according to the sky exposure plane.



OPTION E

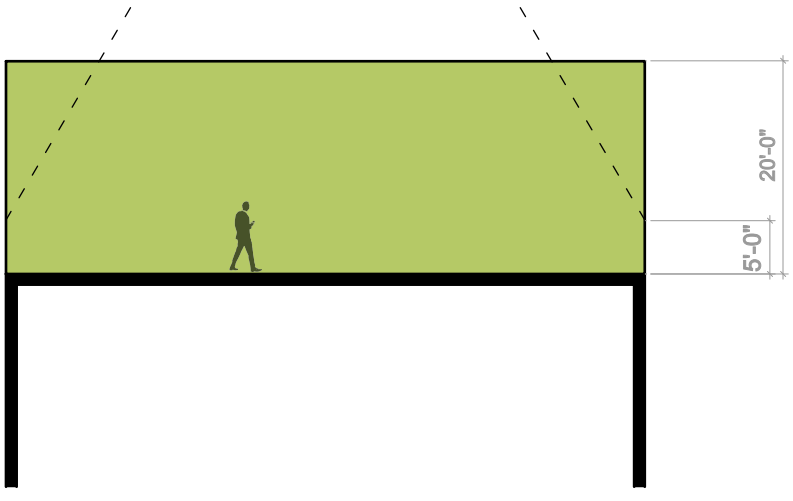
In districts where there’s a front yard, or for existing structures that are not flushed to the lot line, sun spaces can be stacked on the edge of the building. The width of the sun spaces cannot exceed the width of the front yard. Maximum length for sun spaces is 30% of the width of the lot line. Stacked sun spaces can only be used if the adjacent buildings are flushed to the lot line.



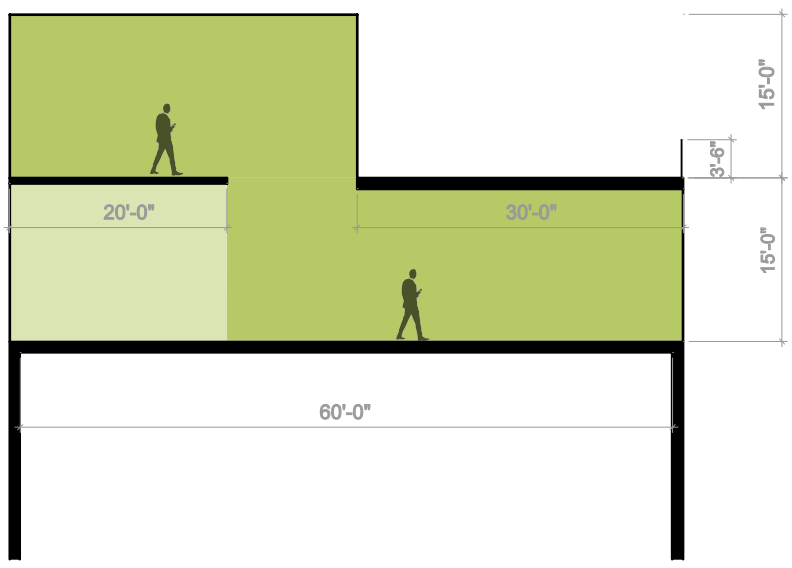
OPTION F

Green vertical walls can be implemented when there’s an height difference with the adjacent buildings or on a corner lot building. In an instance where the building is adjacent to a vacant lot, vertical green walls are not permitted in order not to obstruct future projects on the vacant lot. In the presence of a lower adjacent building vertical green walls must start 8’ above height of the adjacent building. In a corner lot, if there’s a side yard, perimeter walls can be used for protection of the vertical green wall. The maximum height for the perimeter wall is 25’. The depth of the vertical green wall cannot exceed 8”. The depth of the vertical green wall is measured from the exterior of the building shell. When yards are available they can be utilized as accessory programs similar to previous options.

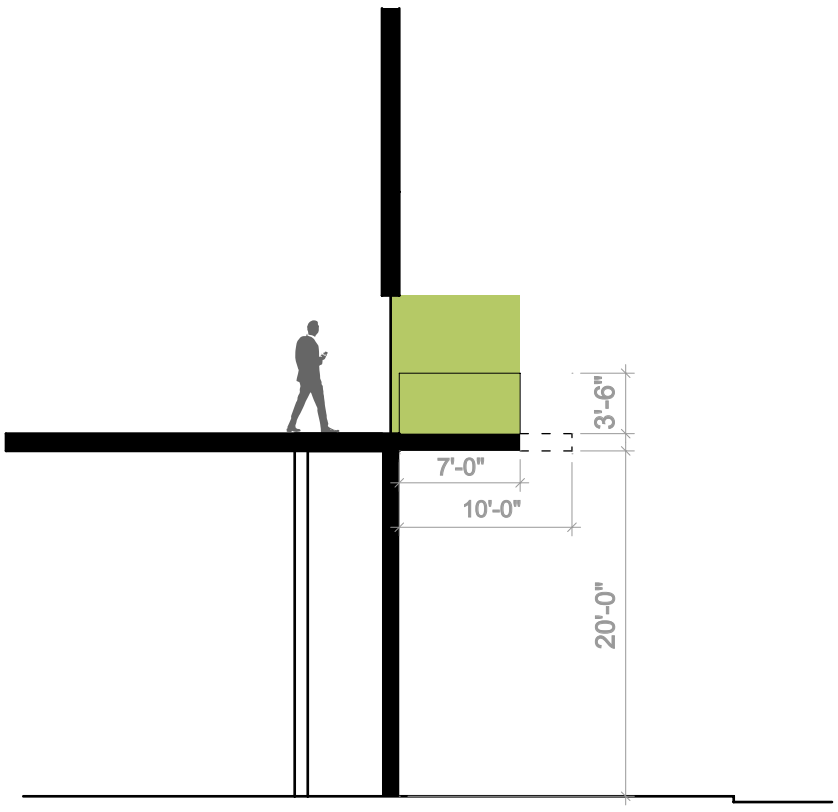
GLOSSARY
REQUIRED MEASUREMENTS FOR OPTIONS



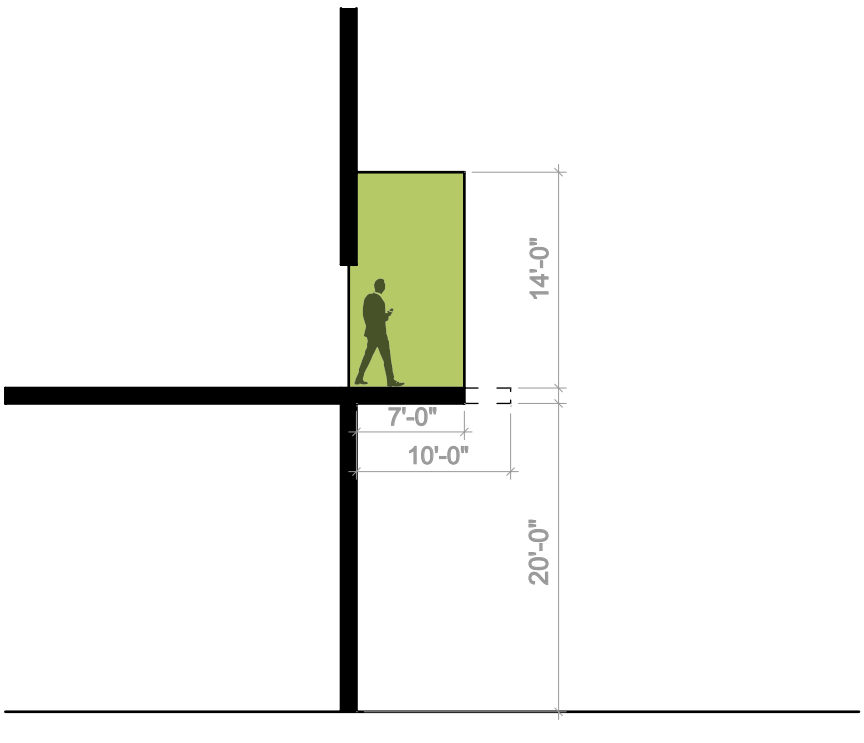
OPTION A
When the existing building height is below the maximum building height, maximum floor height for additional levels for Option A is 20'. If 20' addition exceeds the maximum building height; addition of a singular level is not permitted. Multiple levels with lower floor height must be used in order to submit to the existing maximum building height. Maximum floor height for the level above the maximum existing building height must be the same with the previous G group levels. The angle of the roof must be determined according to the sun exposure plane. The slope must comply with the regulations for the slope the attic.



OPTION B
When the existing building submits to the maximum height requirements; singular additional full level is allowed. Maximum height for the additional full level is 15'. Following levels must comply with the setback requirements. Setbacks are determined according to the sky exposure plane. The maximum height for following levels is 15'. Use of mezzanine levels is permitted. The width of the mezzanine level cannot exceed 1/3rd of the width of the building. Width of the building must be measured from the exterior of the building.

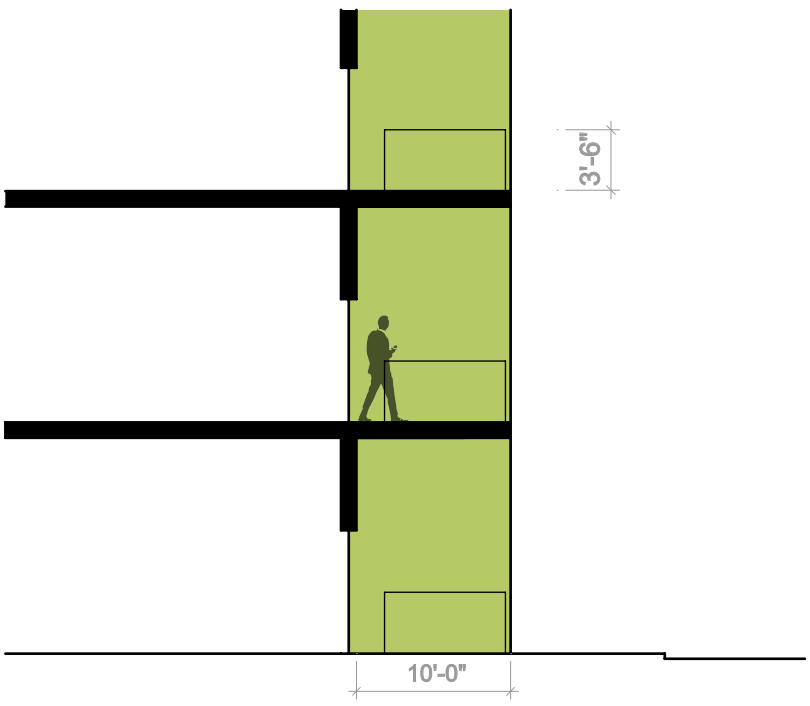


OPTION C
The minimum width for the G group balconies is 7'; the maximum width is 10' Balconies must comply with the guard rail requirements. G group balconies facing the wide street must be 20' above the curb level. In a corner lot, in the presence of a side yard; balconies may start 10' above the curb level.



OPTION D

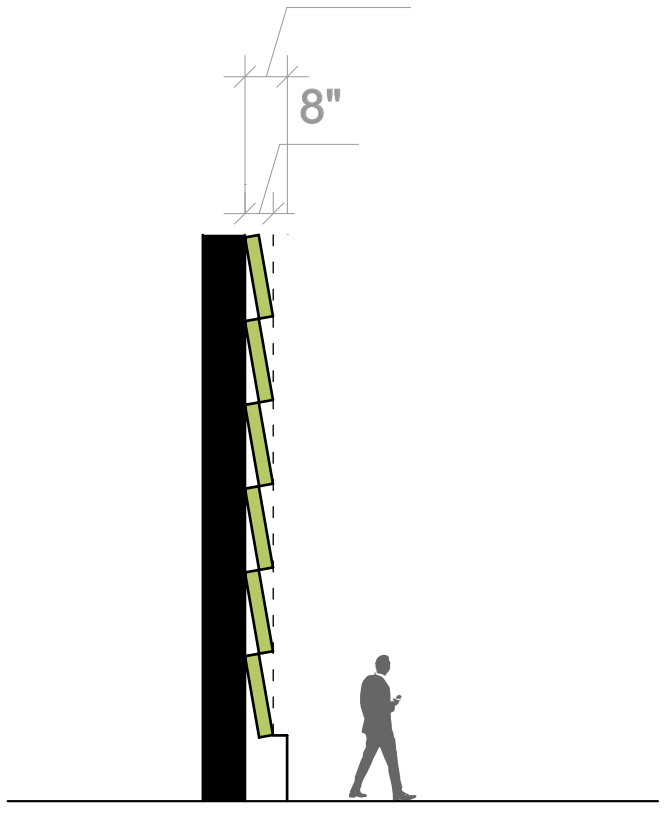
The minimum width for the G group sun spaces is 7’; the maximum width is 10’ G group sun spaces facing the wide street must be 20’ above the curb level. In a corner lot, in the presence of a side yard; sun spaces may start 10’ above the curb level.



OPTION E

In the presence of a front yard; the width of the stacked extend the full width of the front yard. If the adjacent building is not flushed with the lot line, the width of the stacked sun spaces must be determined according to the adjacent building.

1'-0"



OPTION F

The maximum depth of the vertical green wall cannot exceed 8” when measured from the outer shell of the building. If the vertical green wall reaches to the curb level; 1’ wide protective base can be used. The maximum height for the protective base is 18”.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